324

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DENVER, COLORADO

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TRADE NAME	MODEL	SET AND FOLDER No.
Airline	GSE-6000A Color Tel. Rec.	324-2
Airline	GSL-4002A, B, C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A Tel. Rec.	324-3
Automatic	C-300, F-100, F-151, F-152, FM-731, H-400, K-700, P-651, S-500, S-551	324-4
Challenger	CH612, Y	324-5
Crescent	1100	324-6
Crosley	J-17TJBU, TJBUa, TJMU, TJMUa, TOWU, TOWUa (Ch. 441, 441-1) Tel. Rec. Prod. Chg. Bul. 161	324-1
Crosley	J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473) Tel. Rec.	324-7
Dumont	Chassis RA-352 Tel. Rec.	324-8
Firestone	4-A-147, 4-A-148 (Code 1-5-10XF4)	324-9
Motorola	56RF1, 56RF2 (Ch. HS-497)	324-10
Philco	D-664 (Code 124), D-665 (Codes 124, 126)	324-11
Raytheon	C-212B, M, C-220 (Ch. 21T42) Tel. Rec.	324-12
Roland	5X6U	324-13
Sylvania	72M-11A, -11B (Ch. 1-502-5) Tel. Rec. Prod. Chg. Bul. 161	324-1

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 9 IN SET 285

Crosley models H-17TOBUc, TOMUc, TOWUc, H-21COBHb, COBUc, COMHb, COMUc, COSBHb, COSBUc, COSHb, COSUc, COWHb, COWUc, HCBHb, HCBUc, HCMHb, HCMUc, HCWHb, HCWUc, HPBUc, HPWUc, TOBHb, TOBUc, TOMHb, TOMUc, TOWHb, TOWUc (Ch. 434, 441, 442, 445) were covered in Photofact Folder 9 – Set 285.

Models J-17TJBU, J-17TJMU, J-17TOWU (Ch. 441), J-17TJBUa, J-17TJMUa and J-17TOWUa (Ch. 441-1) are electrically identical to the models covered, except for the following changes.

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NEW TUNER

Chassis 441-1 incorporates a new VHF-UHF tuner. VHF tuner part #171005-1 and UHF tuner part #171005-2. A schematic of this tuner is given in Fig. 1.

COMPONENT CHANGES

V8 may be a 5AV8 or a 5B8.

V7 may be a 6BA8 or a 6AW8.

A 68MMF capacitor is added from pin 2 of V9 to ground.

C55 is increased from 33MMF to 82MMF.

A .02MFD capacitor is added from the junction of C31 and R30 to ground.

R28 is decreased from 470Ω to 220Ω.

R84 is decreased from 12KΩ to 8.2KΩ.

The sync couplate network has been changed to part #170207-1. A partial schematic showing the revised circuit is given in Fig. 2.

The vertical output circuit has been revised. A partial schematic is given in Fig. 3 showing the revised circuit.

C2D has been increased from 30MFD to 100MFD. The new part number for C2 is #159940-3.

The vertical output transformer (T3) is changed to part #158726-1.

A 5000MMF is added from the 260V line feeding the tuner to ground.

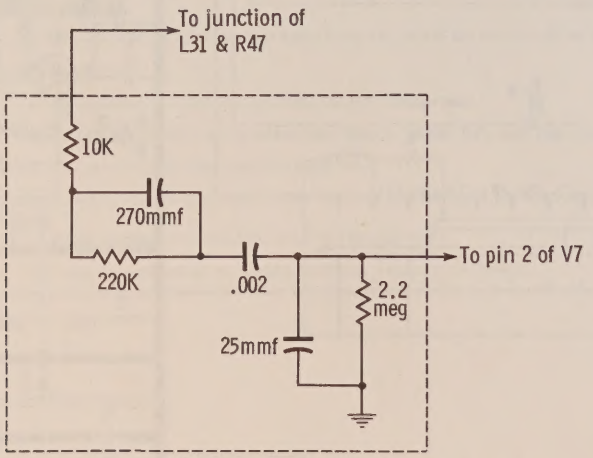

FIG 2

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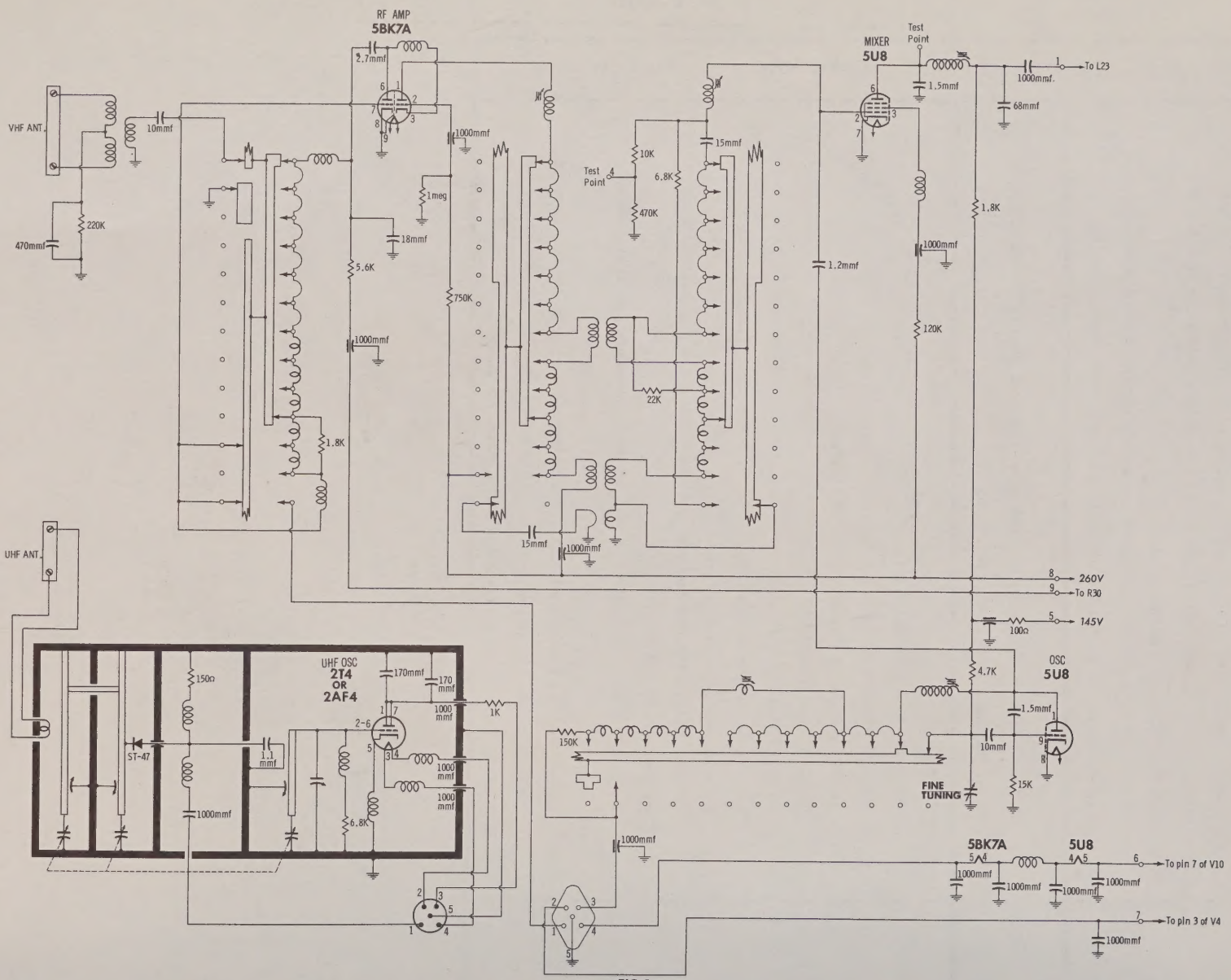

RF AMP
5BK7A
MIXER
5U8
Test Point
VHF ANT.
UHF ANT.
UHF OSC
2T4
OR
2AF4
OSC
5U8
FINE TUNING
5BK7A
5U8
To L23
260V
To R30
145V
To pin 7 of V10
To pin 3 of V4
2.7mmf
10mmf
220K
470mmf
1000mmf
1meg
18mmf
5.6K
750K
1.8K
10K
6.8K
470K
15mmf
22K
1.2mmf
1.5mmf
68mmf
120K
100Ω
4.7K
150Ω
170mmf
1K
1.1 mmf
ST-47
150K
15K

FIG 1

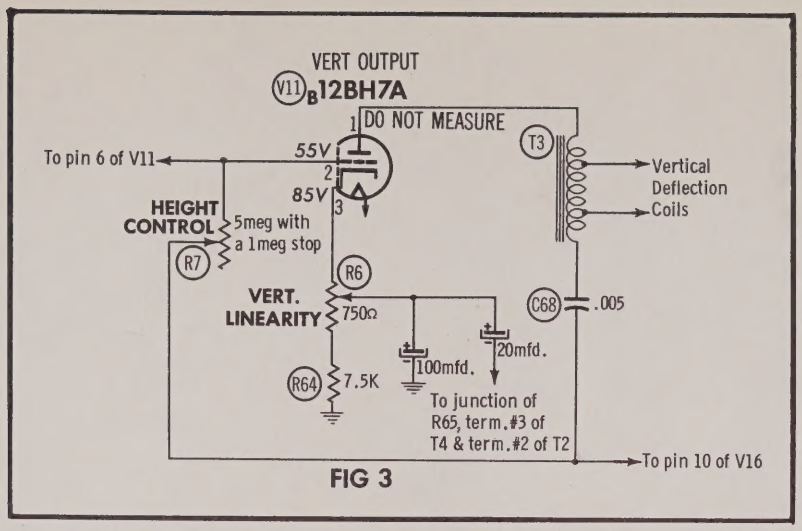


FIG 3

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 12 IN SET 263

Sylvania models 71M-1, 72B-1, 72M-1 (Ch. 1-502-1), 73M-1 and 73M-2 (Ch. 1-502-2) were covered in Photofact Folder 12 — Set 263.

Late production changes and model additions were added with the publication of Production Change Bulletin 42 — Set 176-1.

Models 72M-11A and 72M-11B (Ch. 1-502-5) are electrically identical to the models covered, except for the following changes.

NEW POWER TRANSFORMER

In chassis 1-502-5 the power transformer (T1) has been changed to part #141-0022, and a power selector plug (part #415-0014) has been added. The proper positioning of the power selector plug allows operation of these receivers on 117 volts or 234 volts AC power. A partial schematic is given on the reverse side showing the revised circuit.

NEW TUBES

V12, audio output, is changed from a 6V6GT to a 6K6GT.

V16, horizontal AFC, is changed from a 6AU6 to a 6CB6.

COMPONENT CHANGE

A 220KΩ line isolation resistor is added from one side of the primary of the power transformer to ground.

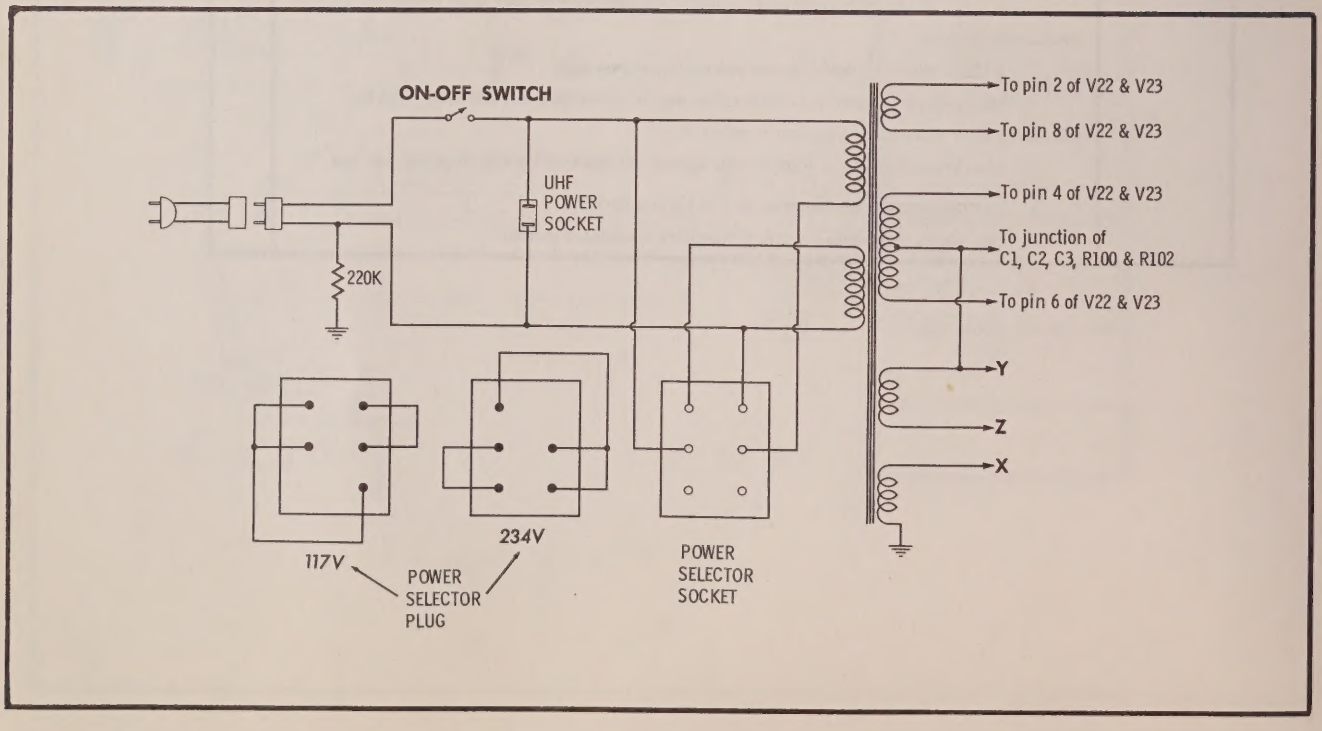
A 10KΩ resistor is added in series with the high voltage lead.

The height control (R3) is increased from 1Meg to 1.5Meg (new part #153-0014). With the new control (R73) is decreased from 1Meg to 470KΩ.

When V16 is changed to a 6CB6, a 220Ω resistor is added from pin 2 of V16 to the -115V line.

A .1MFD capacitor is added from pin 2 of V16 to ground.

C85 may be replaced by two .1MFD capacitors connected in parallel.


ON-OFF SWITCH
UHF
POWER
SOCKET
220K
To pin 2 of V22 & V23
To pin 8 of V22 & V23
To pin 4 of V22 & V23
To junction of
C1, C2, C3, R100 & R102
To pin 6 of V22 & V23
Y
Z
X
117V
234V
POWER
SELECTOR
PLUG
POWER
SELECTOR
SOCKET

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

AIRLINE
MODEL GSE-6000A

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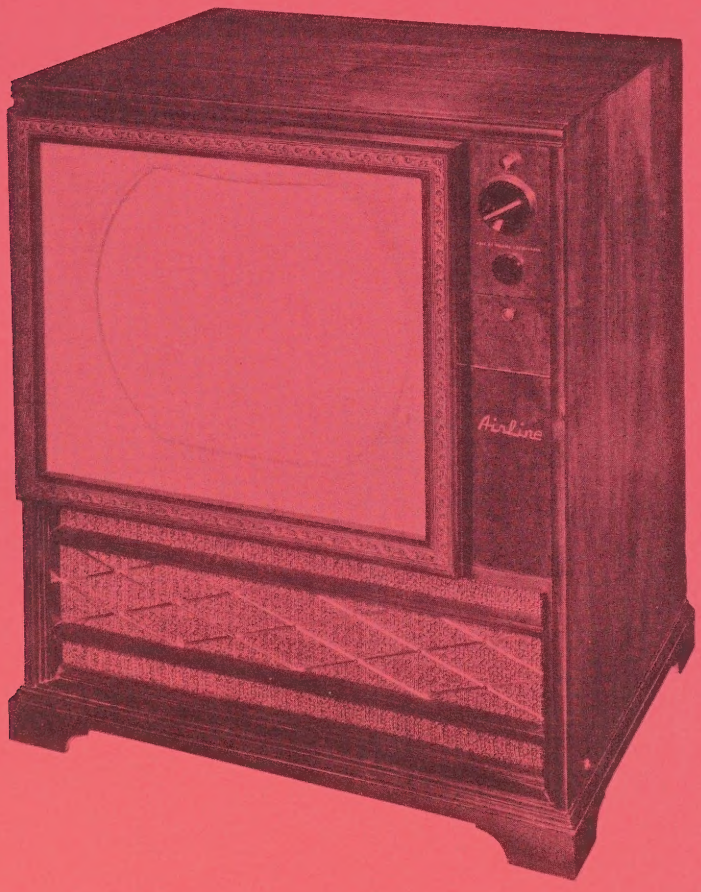

MODEL GSE-6000A

AIRLINE
MODEL GSE-6000A

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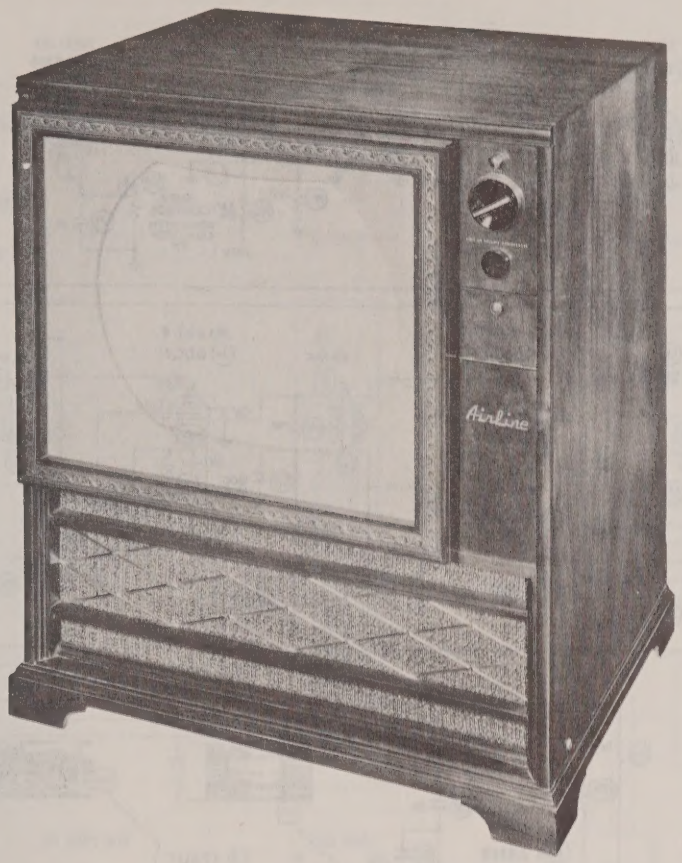
DATE 7-56 SET 324 FOLDER 2

AIRLINE
MODEL GSE-6000A



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AIRLINE
MODEL GSE-6000A

TRADE NAME	Airline Model GSE-6000A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Color Television Receiver
TUBES	Twenty-nine
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 3.55 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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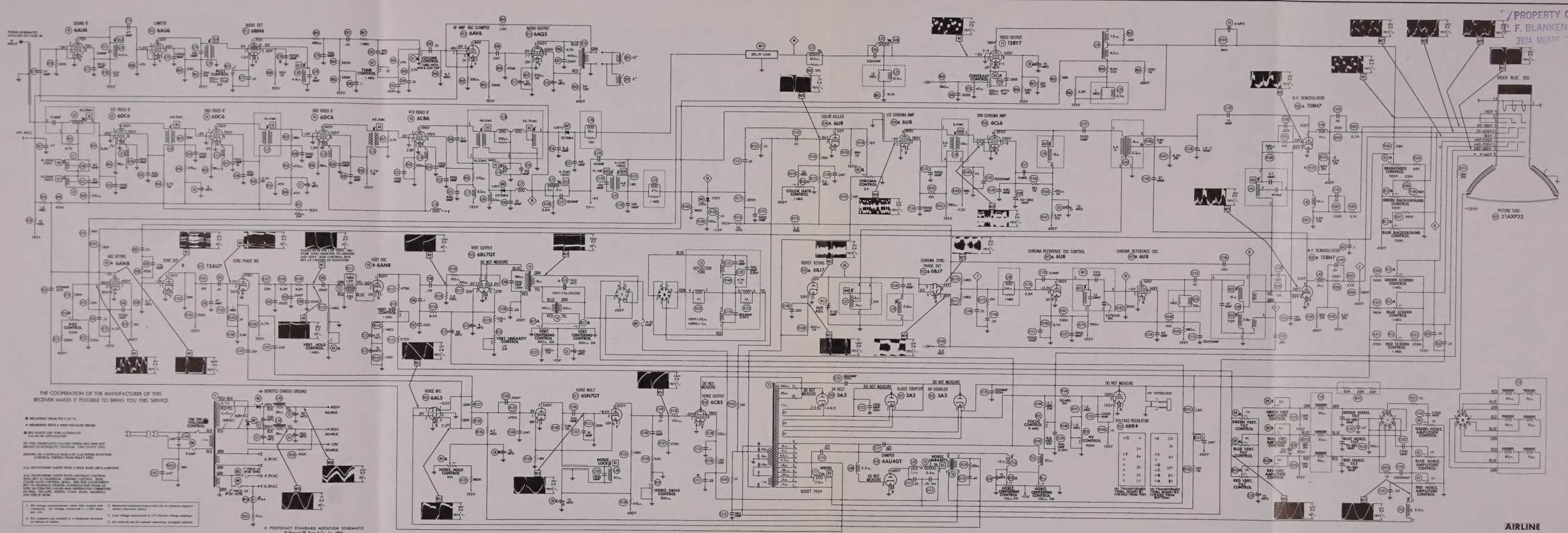
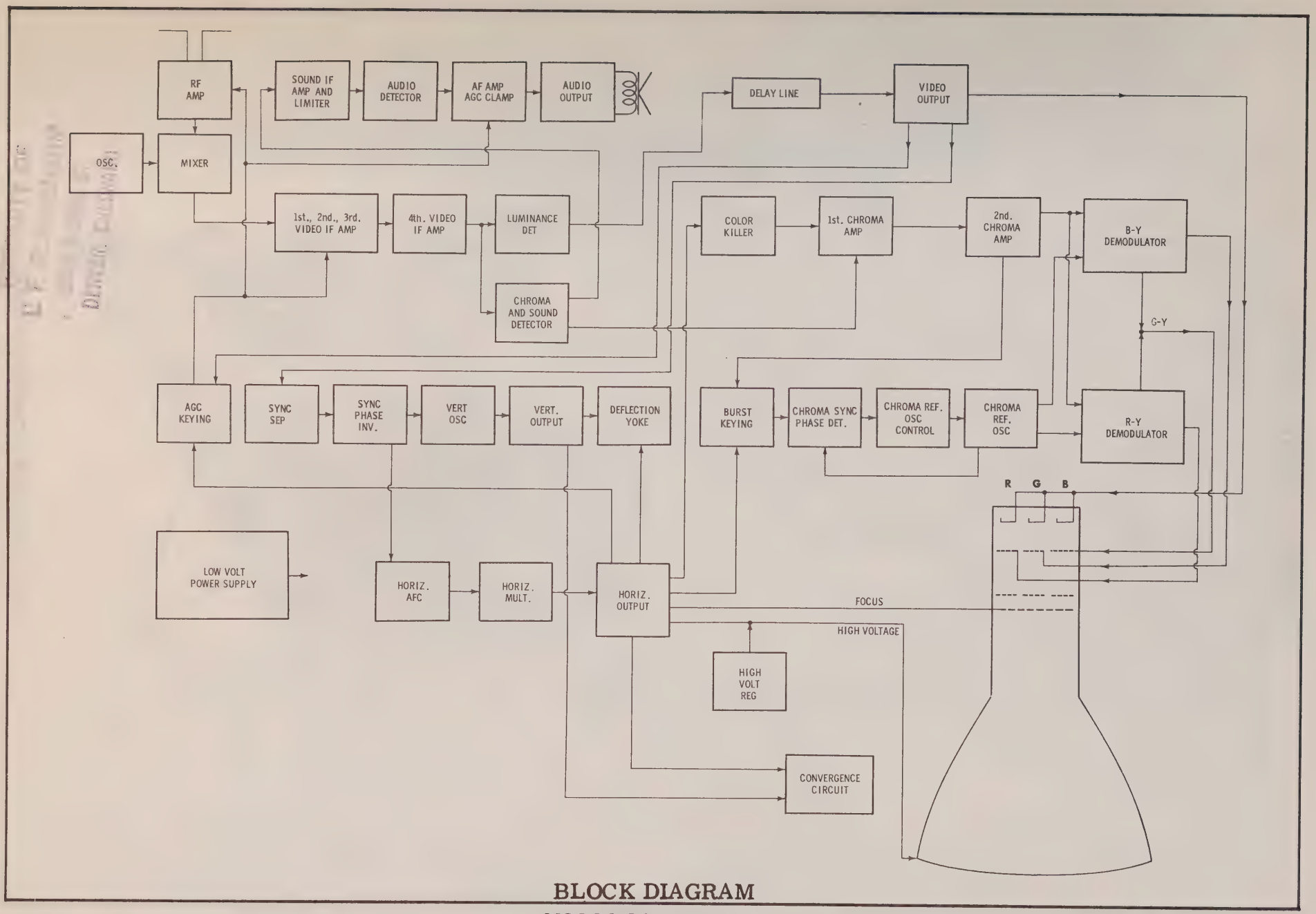


AIRLINE
MODEL GSE-6000A



BLOCK DIAGRAM

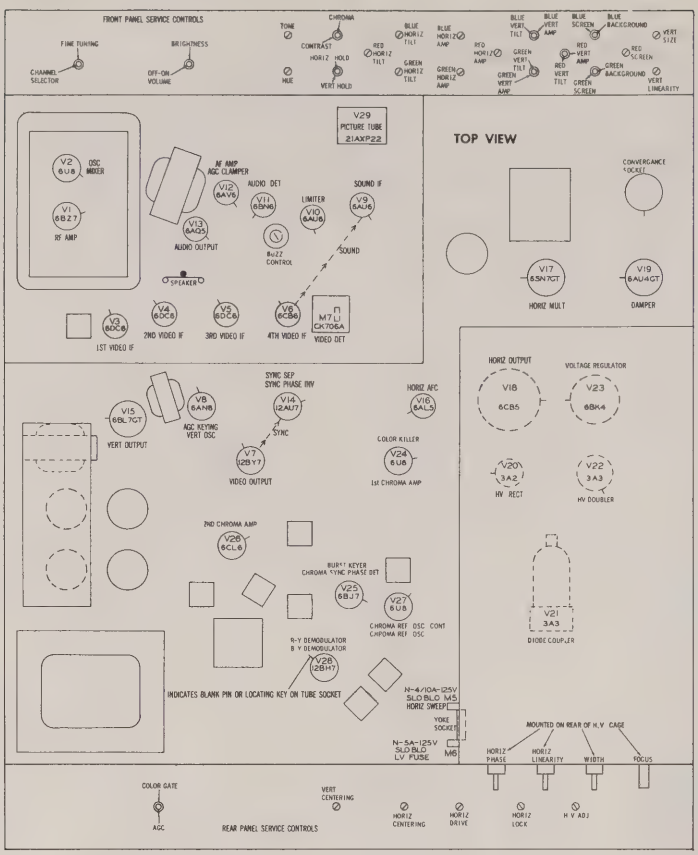
MODEL GSE-6000A

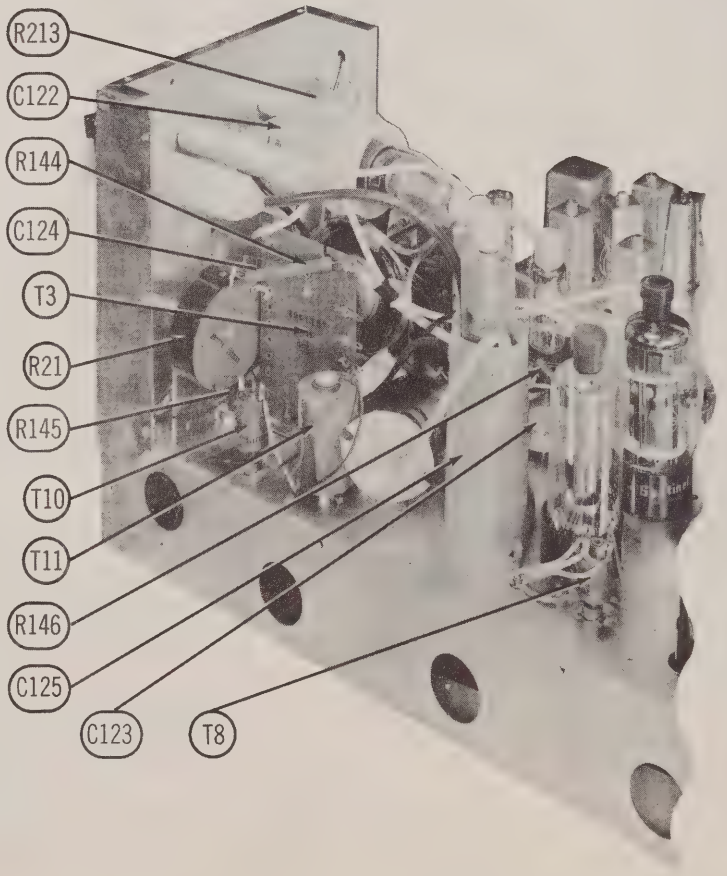
AIRLINE

SET 324 FOLDER 2

PAGE 3

TUBE PLACEMENT CHART





HIGH VOLTAGE COMPARTMENT

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†500Ω	270KΩ	INF	0Ω	.1Ω	INF	1.5Meg	22Ω	0Ω
V 2	6U8	†13KΩ	200KΩ	†30KΩ	.1Ω	0Ω	†8.2KΩ	0Ω	0Ω	10KΩ
V 3	6DC6	100KΩ	56Ω	0Ω	.1Ω	†3.2KΩ	†3.2KΩ	0Ω		
V 4	6DC6	100KΩ	68Ω	0Ω	.1Ω	†3.2KΩ	†3.2KΩ	0Ω		
V 5	6DC6	50KΩ	56Ω	0Ω	.1Ω	†2.7KΩ	†2.7KΩ	0Ω		
V 6	6CB6	.1Ω	330Ω	0Ω	.1Ω	†500Ω	†500Ω	0Ω		
V 7	12BY7	55Ω	4KΩ	0Ω	.1Ω	.1Ω	0Ω	†5.5KΩ	†3.2KΩ	0Ω
V 8	6AN8	▲1.3Meg	1.5Meg	230Ω	0Ω	.1Ω	500KΩ	ǂ10KΩ	†22KΩ	†4.7KΩ
V 9	6AU6	100KΩ	0Ω	0Ω	.1Ω	†33KΩ	†33KΩ	0Ω		
V 10	6AU6	47KΩ	0Ω	0Ω	.1Ω	†15KΩ	†15KΩ	0Ω		
V 11	6BN6	300Ω	.6Ω	.1Ω	0Ω	†33KΩ	4.6Ω	†440KΩ		
V 12	6AV6	4.7Meg	180Ω	.1Ω	0Ω	1.5Meg	1.5Meg	†330KΩ		
V 13	6AQ5	470KΩ	270Ω	.1Ω	0Ω	ǂ3.4KΩ	ǂ3KΩ	470KΩ		
V 14	12AU7	†4.7KΩ	1Meg	5KΩ	0Ω	0Ω	†30KΩ	2.7Meg	0Ω	.1Ω
V 15	6BL7GT	2.2Meg	ǂ400Ω	600Ω	2.2Meg	ǂ400Ω	600Ω	0Ω	.1Ω	
V 16	6AL5	3KΩ	3KΩ	.1Ω	0Ω	4.5Meg	0Ω	4.5Meg		
V 17	6SN7GT	5Meg	ǂ6KΩ	1.8KΩ	100KΩ	ǂ120KΩ	1.8KΩ	.1Ω	0Ω	
V 18	6CB5	NC	.1Ω	0Ω	TP	470KΩ	TP	0Ω	ǂ12KΩ	TOP CAP ▲13Ω
V 19	6AU4GT	NC	NC	300KΩ	NC	ǂ40Ω	NC	0Ω	.1Ω	
V 20	3A2	15Meg	15Meg	NC	15Meg	15Meg	15Meg	NC	15Meg	15Meg TOP CAP ▲38Ω
V 21	3A3	PINS	1 - 8	HAVE	INF	RESISTANCE				TOP CAP 15Meg
V 22	3A3	PINS	1 - 8	HAVE	INF	RESISTANCE				TOP CAP INF
V 23	6BK4	†1KΩ	0Ω	NC	NC	1.2Meg	NC	.1Ω	NC	TOP CAP INF
V 24	6U8	†15KΩ	450KΩ	†11KΩ	.1Ω	0Ω	†600Ω	0Ω	0Ω	3Meg
V 25	6BJ7	1.5Meg	1.8Ω	TP	.1Ω	0Ω	1.8Ω	220Ω	1.5Meg	1.8Ω
V 26	6CL6	0Ω	400Ω	ǂ20KΩ	0Ω	.1Ω	ǂ4KΩ	0Ω	ǂ20KΩ	400Ω
V 27	6U8	†600Ω	100KΩ	†11KΩ	.1Ω	0Ω	†600Ω	0Ω	2.7KΩ	1.5Meg
V 28	12BH7	ǂ40KΩ	17KΩ	6.8KΩ	0Ω	0Ω	†15KΩ	17KΩ	ǂ6.8KΩ	.1Ω
V 29	21AXP22	†100KΩ	ǂ100KΩ	▲400Ω-600KΩ	ǂ40KΩ	ǂ40KΩ	ǂ80KΩ	▲20Ω - 400KΩ	NC	10Meg
							PIN 11 ▲20-400KΩ	PIN 12 ǂ100KΩ	PIN 13 ǂ40KΩ	PIN 14 †100KΩ

† MEASURED FROM POSITION SIDE OF C2.
ǂ MEASURED FROM POSITIVE SIDE OF C1.
▲ MEASURED FROM PIN 3 OF V19.
TP - TIE POINT
NC - NO CONNECTION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard should be eliminated. This may be done by disconnecting pin 3 of the horizontal output tube (V16) from the chassis and inserting a 200Ω, 10 watt resistor from pin 3 of V16 to chassis. Then remove the horizontal multivibrator tube (V17) from its socket.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to the ungrounded side of C6. Connect the positive lead to chassis. Use only enough signal generator output to provide usable reading on VTVM. The local oscillator may be disabled by removing the oscillator strip for an unused channel and switching the channel selector to that channel. This will reduce the possibility of erroneous indications during alignment

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V3). Low side to chassis.	41.25MC (Unmod.)	Any	DC probe thru 10KΩ to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	43.75MC	"	"	A2	Attenuate signal generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
3.	"	"	46.0MC	"	"	A3	Adjust for maximum deflection. Repeat steps 1 thru 3 until no change is noted.
4.	"	"	43.5MC	"	"	A4	Attenuate signal generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
5.	"	"	41.4MC	"	"	A5	"
6.	"	"	45.5MC	"	"	A6	"
7.	"	"	47.25MC	"	"	A7	Adjust for MINIMUM deflection.
8.	"	"	41.25MC	"	"	A8	"
9.	"	"	45.75MC	"	"	A9	Attenuate signal generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
10.	"	"	42.75MC	"	"	A10	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment". In steps 12 through 14 adjust for -4 volts bias. Remove bias to observe trap markers. If sweep generator has no built marker, couple a separate marker loosely to sweep generator output. Alternate sweep generator output to provide not more than 5 volts peak to peak on scope. Connect a 68 ohm carbon resistor across sweep generator output. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.0015MFD	High side thru .0015MFD capacitor to pin 5 (plate) of 3rd Video IF Amplifier Tube (V3). Low side to chassis.	44.0MC (100MC Swp.)	41.25MC 41.65MC 45.0MC 47.25MC	Any	Vert. amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2, A3	Adjust A2 and A3 for response curve similar to Fig. 1. If necessary SLIGHTLY retouch A1 to place 41.25MC trap marker in trap notch as in Fig. 1.
12.	"	High side to pin 1 (grid) of 1st Video IF Amplifier Tube (V3). Low side to chassis near V3.	"	41.25MC 41.65MC 45.0MC 45.75MC 47.25MC	"	"	A4, A5, A6	Increase bias to -4 volts at ungrounded side of C6 and chassis. Alternate sweep generator output to produce 6 volts peak to peak on scope. Adjust for response curve similar to Fig. 2. A4 affects tilt. A5 affects bandwidth on low frequency end. A6 affects high frequency side and position of 45.75MC marker.
13.	Direct	High side to an ungrounded tube shield floating over converter tube (V3). Low side to chassis.	"	41.25MC 41.65MC 45.75MC 47.25MC	"	Vert. Amp. thru detector (Fig. 5) to pin 5 (plate) of 1st Video IF Amplifier Tube (V3). Low side to chassis.	A8, A9, A10	Connect a short clip lead across the 47.25MC trap coil (L6). Check for response curve similar to Fig. 3. If necessary, adjust A9 and A10 for desired response. SLIGHTLY retouch A8 to place 41.25MC marker in trap notch as in Fig. 3. Remove short from (L6).
14.	"	"	"	41.25MC 41.65MC 45.0MC 45.75MC 47.25MC	"	Vert. amp. thru 10KΩ to point (A). Low side to chassis.		Check for overall IF response curve similar to Fig. 4. If necessary SLIGHTLY retouch A4, A5, and A8 for desired response. Check position of 41.25MC and 47.25MC traps. If necessary, increase generator output and SLIGHTLY retouch A1 (41.25MC) and A7 (47.25MC) to place markers in trap notches as in Fig. 4.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR, AM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. Set volume control at low volume level.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	.01MFD	High side to point (D). Low side to chassis.	4.5MC (400% Mod.) (30KC Swp.)	4.5MC	Any non-interfering channel	Across secondary of Audio Output Trans. (T15).	All	Set buss control (R23) 90° from maximum clockwise rotation. Adjust All for maximum 400% indication on scope.
16.	"	"	"	"	"	"	A13, A13, A14	Attenuate generator output so that signal is below the limiting level of the 6BN6 as evidenced by background hiss in the speaker. Adjust A12, A13 and A14 for maximum 400% indication on scope.
17.	"	"	"	4.5MC (400% Mod)	"	"	R23	Use a high generator output and adjust R23 for MINIMUM 400% indication on scope.
18.	"	"	"	4.5MC	"	"	All	With volume control at low level, retouch All for maximum 400% indication on scope.

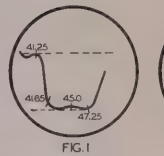


FIG. 1

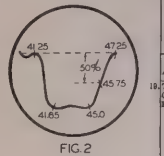


FIG. 2

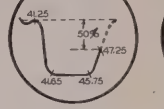


FIG. 3

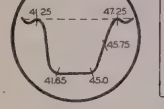


FIG. 4

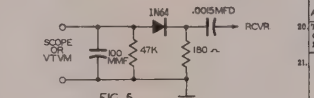


FIG. 5

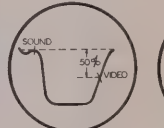


FIG. 6

FIG. 7

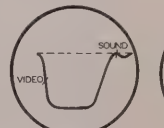


FIG. 8

FIG. 9

OSCILLATOR ALIGNMENT

Replace the local oscillator strip back in tuner. The channel oscillator adjustment screws are reached thru a hole just to the left of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Use only enough sweep generator output to provide usable pattern on scope. Leave bias connected as under "Overall Video IF Response Check" and connect a jumper from ungrounded side of C6 to the tuner AGC terminal. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Set the fine tuning control to the mid-position of its range

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Two 120Ω Carbon Resistors	Across antenna terminal with 120Ω in each lead.	213MC (10MC Swp.)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A15	Adjust to place sound marker as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp.)	205.75MC 209.75MC	12		A16	
			201MC (10MC Swp.)	199.25MC 203.75MC	11		A17	
			195MC (10MC Swp.)	193.25MC 197.75MC	10		A18	
			189MC (10MC Swp.)	187.25MC 191.75MC	9		A19	
			183MC (10MC Swp.)	181.25MC 185.75MC	8		A20	
			177MC (10MC Swp.)	175.25MC 179.75MC	7		A21	
			85MC (10MC Swp.)	83.25MC 87.75MC	6		A22	
			79MC (10MC Swp.)	77.25MC 81.75MC	5		A23	
			89MC (10MC Swp.)	67.25MC 71.75MC	4		A24	
			83MC (10MC Swp.)	81.25MC 85.75MC	3		A25	
			57MC (10MC Swp.)	55.25MC 59.75MC	2		A26	

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
20.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205.25MC 209.75MC	13	Vert. amp. thru 10KΩ to point (C). Low side to chassis.	A27, A28, A29	Adjust for response similar to Fig. 7 with markers above 90%.
21.	"	"	213MC (10MC Swp.)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel, make compromise adjustment of A27, A28, and A29 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp.)	199.25MC 203.75MC	11			
			195MC (10MC Swp.)	193.25MC 197.75MC	10			
			189MC (10MC Swp.)	187.25MC 191.75MC	9			
			183MC (10MC Swp.)	181.25MC 185.75MC	8			
			177MC (10MC Swp.)	175.25MC 179.75MC	7			
			85MC (10MC Swp.)	83.25MC 87.75MC	6			
			79MC (10MC Swp.)	77.25MC 81.75MC	5			
			89MC (10MC Swp.)	67.25MC 71.75MC	4			
			83MC (10MC Swp.)	81.25MC 85.75MC	3			
			57MC (10MC Swp.)	55.25MC 59.75MC	2			

44MC TRAP ADJUSTMENT

The IF trap adjustment (A30) is for the purpose of eliminating interference in the IF range Tune to the channel on which interference is noted and adjust A30 for MINIMUM interference. Check to see that reception on channel 2 has not been affected.

OVERALL VIDEO IF AND TUNER RESPONSE CHECK

Connect bias as under "Overall Video IF Response Check" and connect jumper from ungrounded side of C6 to the tuner AGC terminal. Use only enough sweep generator output to provide usable pattern on scope. Connect a 68 ohm carbon resistor across the sweep generator output. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
22.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205.25MC 209.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 8. If necessary SLIGHTLY retouch A4, A5, and A8 for desired response.

CHROMA BANDPASS AMPLIFIER ALIGNMENT

Remove the chroma reference oscillator tube (6U8/V37) from its socket. Connect a short clip lead from pin 9 of the color killer tube (V24) to chassis. Connect the negative lead of a 5 volt bias supply to point (E). Positive to chassis. Replace V17 in its socket. Remove 200 ohm/ 10 watt resistor from pin 3 of V16 and reconnect V16 to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23.	3.9KΩ Carbon Resistor	High side to point (B). Low side to chassis.	Not used	4.5MC (Unmod.)	Any	Use VTVM DC probe to pin 1 (cathode) of color phase detector tube (V24B). Common to chassis.	A34, A13	Attenuate signal generator output or maintain not more than 5 volts on VTVM. Adjust for MINIMUM deflection. Retouch A11 for MINIMUM
24.	"	"	"	4.1MC	"	"	A35	Adjust for maximum deflection.
25.	"	"	"	3.0MC	"	"	A36	"
26.	Connect a .05MFD capacitor from pin 2 of 1st chroma amplifier V24B to chassis. Replace V37 in its socket. Connect vert. amplifier of scope to point (B). Low side to chassis. Adjust A37 for MINIMUM amplitude of hash on scope, then adjust the 2nd chroma amplifier screen by-pass trimmer (A38) for MINIMUM hash. Repeat adjustments of A37 and A38 until a position of A37 is found with MINIMUM hash. Remove .05MFD from pin 2 of V24B.							
27.	3.9KΩ Carbon Resistor	High side to point (B). Low side to chassis.	3MC (10MC Swp.)	3.1MC 4.1MC 4.5MC	Any	Vert. Amp. thru detector (Fig. 5) to pin 6 of R-Y demodulator (V28B). Low side to chassis.		Couple a marker generator loosely to pin 2 of V24B (1st chroma Amp. tube). Remove V28 from its socket. Check for response curve similar to Fig. 9. If necessary SLIGHTLY retouch A39 and A36 for desired [illegible]

AIRLINE MODEL GSE-6000A

ALIGNMENT INSTRUCTIONS (cont)

3.58MC TRAP ALIGNMENT

Set brightness and contrast controls fully clockwise.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
28.	.005MFD	High side to point (A). Low side to chassis.	Not used	3.58MC (400∿ Mod)	Any	Vert. Amp. thru detector (Fig. 5) to pin 5 (cathode) of picture tube. Low side to chassis.	A39	Adjust for MINIMUM 400∿ Mod. on scope. Remove 200Ω/2 Watt resistor from pin 3 of V18 to chassis. Connect pin 3 of V18 to chassis. Replace V17 in its socket.

CHROMA REFERENCE OSCILLATOR ALIGNMENT

1. Connect the DC probe of a VTVM to point (D). Common to chassis.
Adjust the reference oscillator plate coil slug (A31) for maximum negative reading on VTVM. Remove VTVM.
2. Connect the vertical amplifier of scope to point (E). Low side to chassis. Adjust the bottom slug of the chroma reference oscillator coil (A32) for maximum indication on scope. Turn the top slug of the chroma reference oscillator coil slug (A33) two turns in either direction. Readjust A32 again for maximum indication on scope. Continue adjusting A32 and A33 until a position of A33 is found that gives maximum indications on scope. Check peak to peak voltage on scope at point (E).
3. Connect the vertical amplifier of scope to point (F). Low side to chassis. Check the peak to peak voltage at point (F). It should be the same as at point (E). If necessary, repeat step 2. Remove scope.
4. Connect a color bar generator across antenna terminals. Connect a short clip lead from point (I) to chassis. Check color oscillator sync. If necessary, adjust A31 until the color bars appear to move slowly from one side of the screen to the other. Remove short from point (I) and chassis. Color bars should now be in sync.

BURST COIL ADJUSTMENT

Connect a color bar generator across antenna terminals. Set the hue control at one half mesh position. Turn the contrast control fully counter clockwise. Turn the chroma control one half turn from its maximum counter clockwise position. Connect DC probe of VTVM to pin 1 of color phase detector (V25). Common to chassis. Adjust the burst coil slug (A40) for maximum deflection on VTVM.

R-Y AND B-Y BALANCE ADJUSTMENT

Connect a color bar generator across antenna terminals. Connect the vertical amplifier of the scope through a low capacity probe to point (J). Low side to chassis.
Set the hue control to one half mesh. Adjust A40 until the color bars appear in their proper ratios as in Fig. 10, B-Y. When the proper relationship is obtained move the scope probe to point (K). Adjust A41 until the color bars appear on the scope in their proper ratio as in Fig. 10, R-Y. When ratios cannot be brought within reasonable tolerance, slight corrections can be made with the hue and chroma controls.

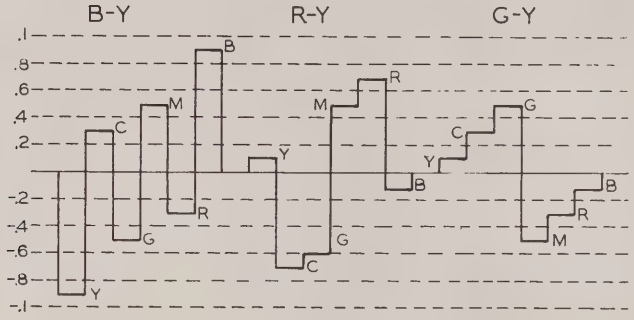
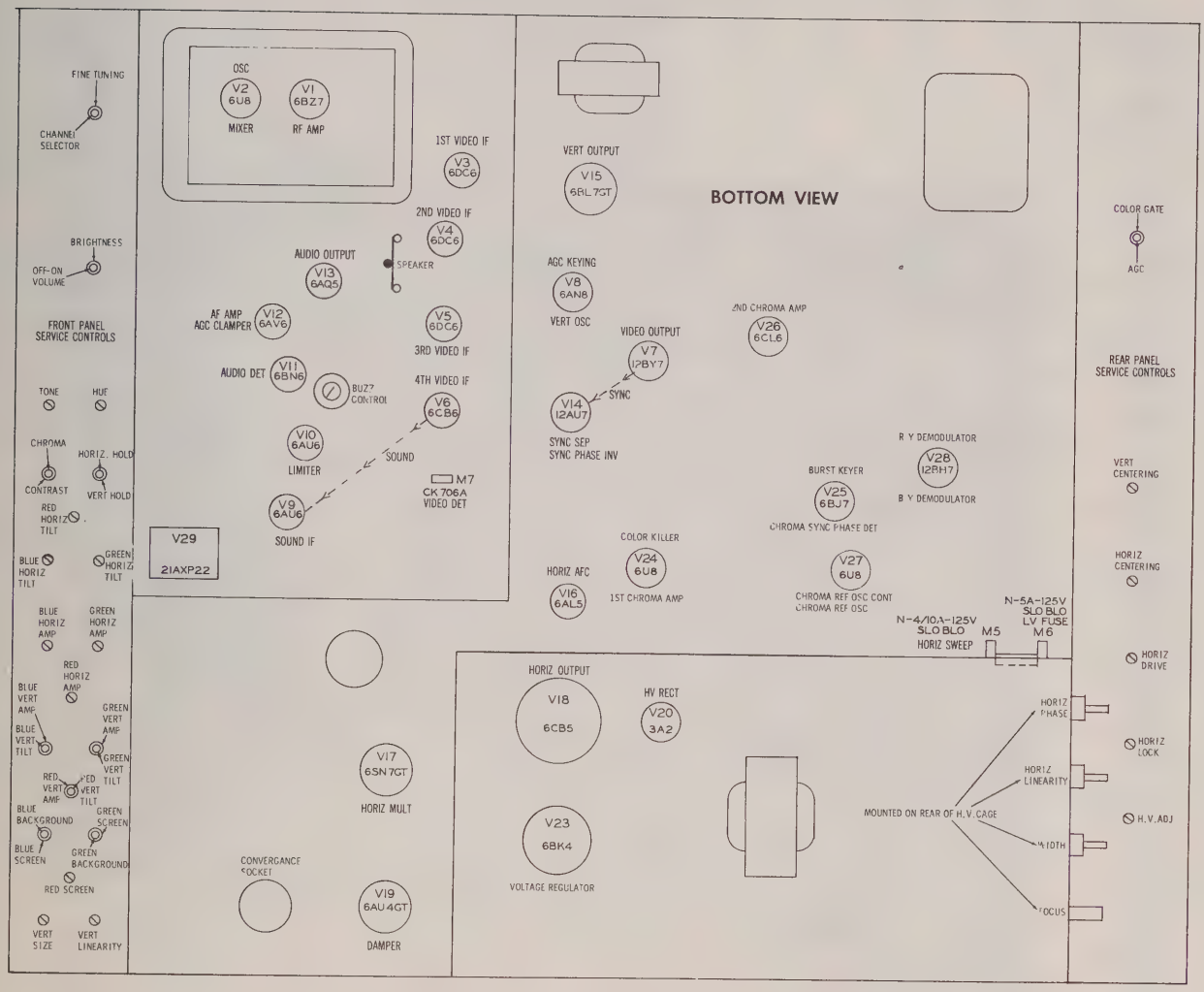


FIG. 10

TUBE PLACEMENT CHART



AIRLINE
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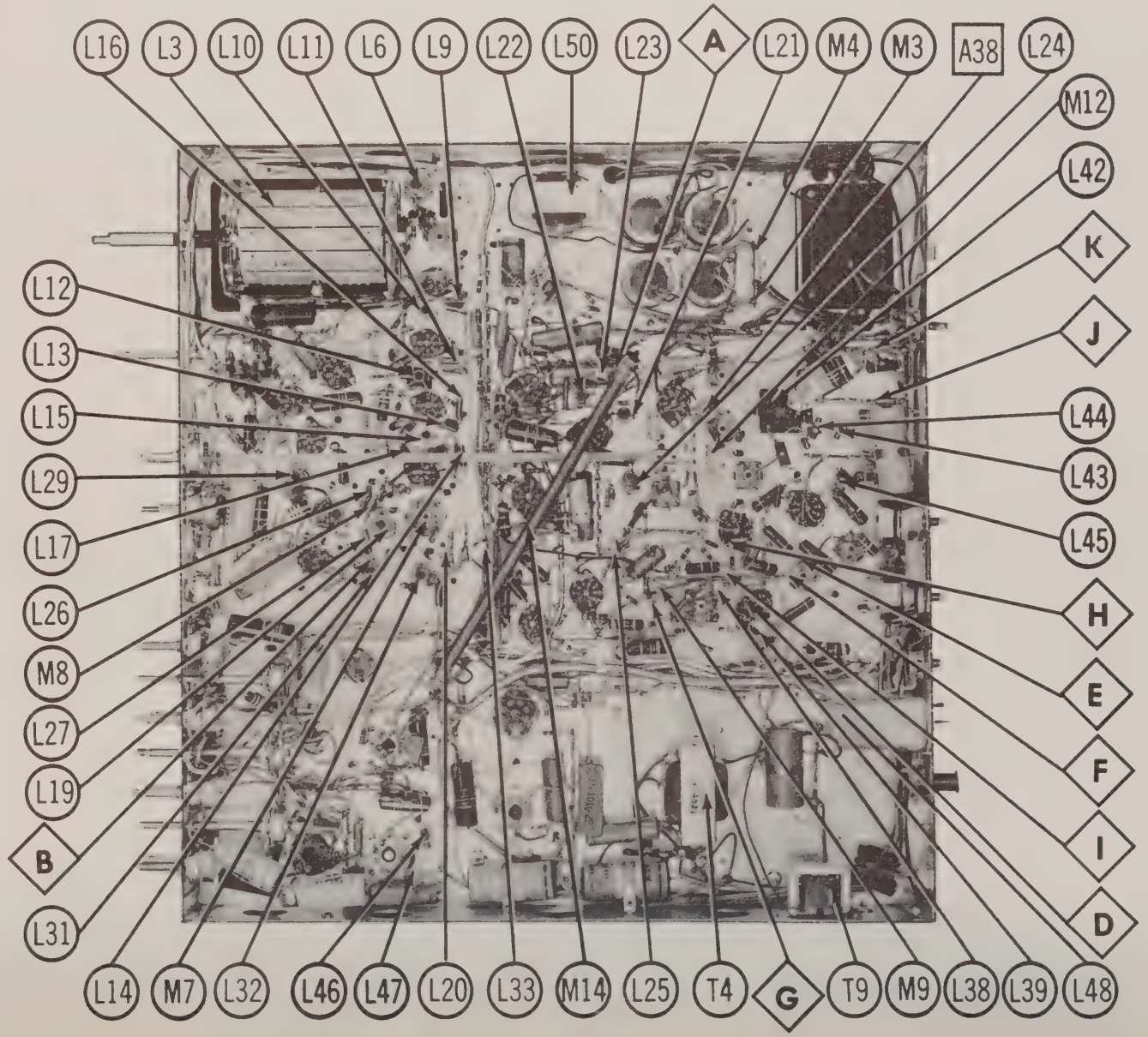
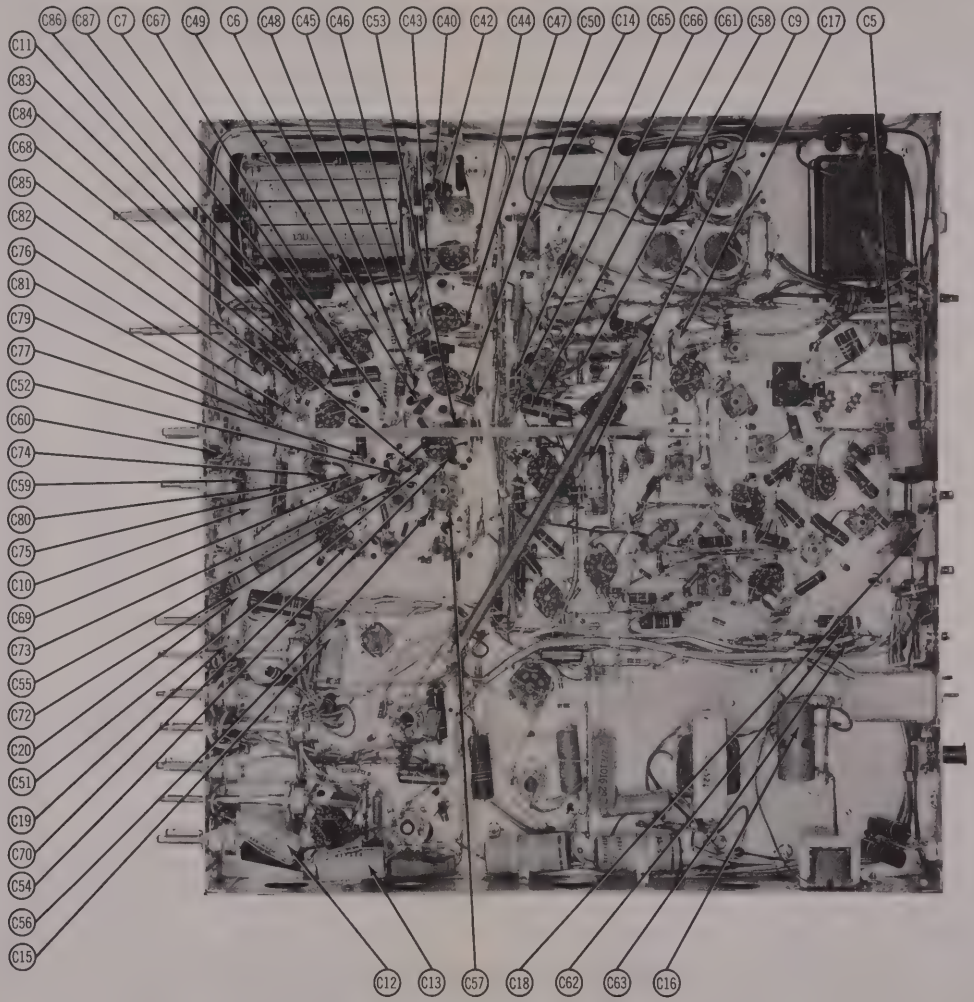
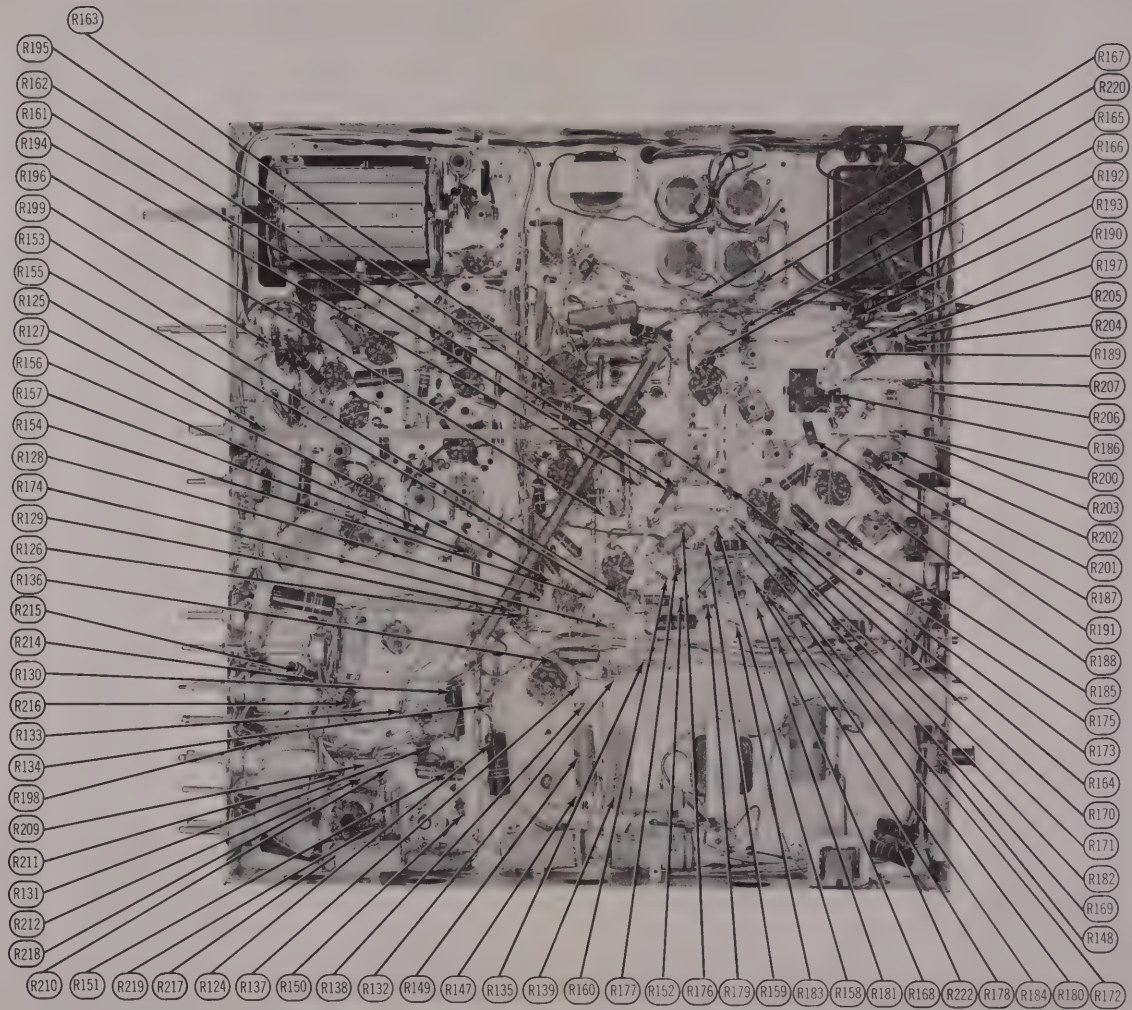


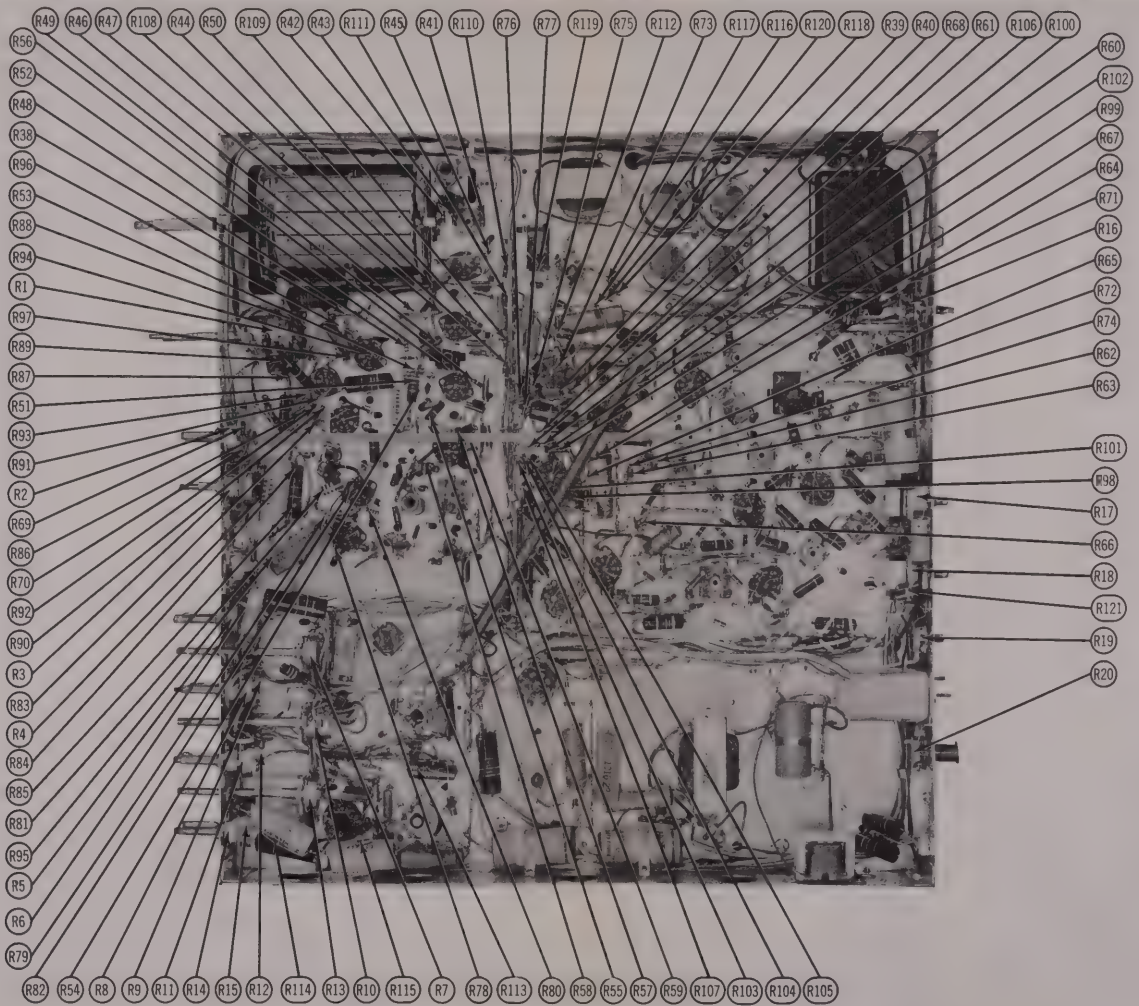
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



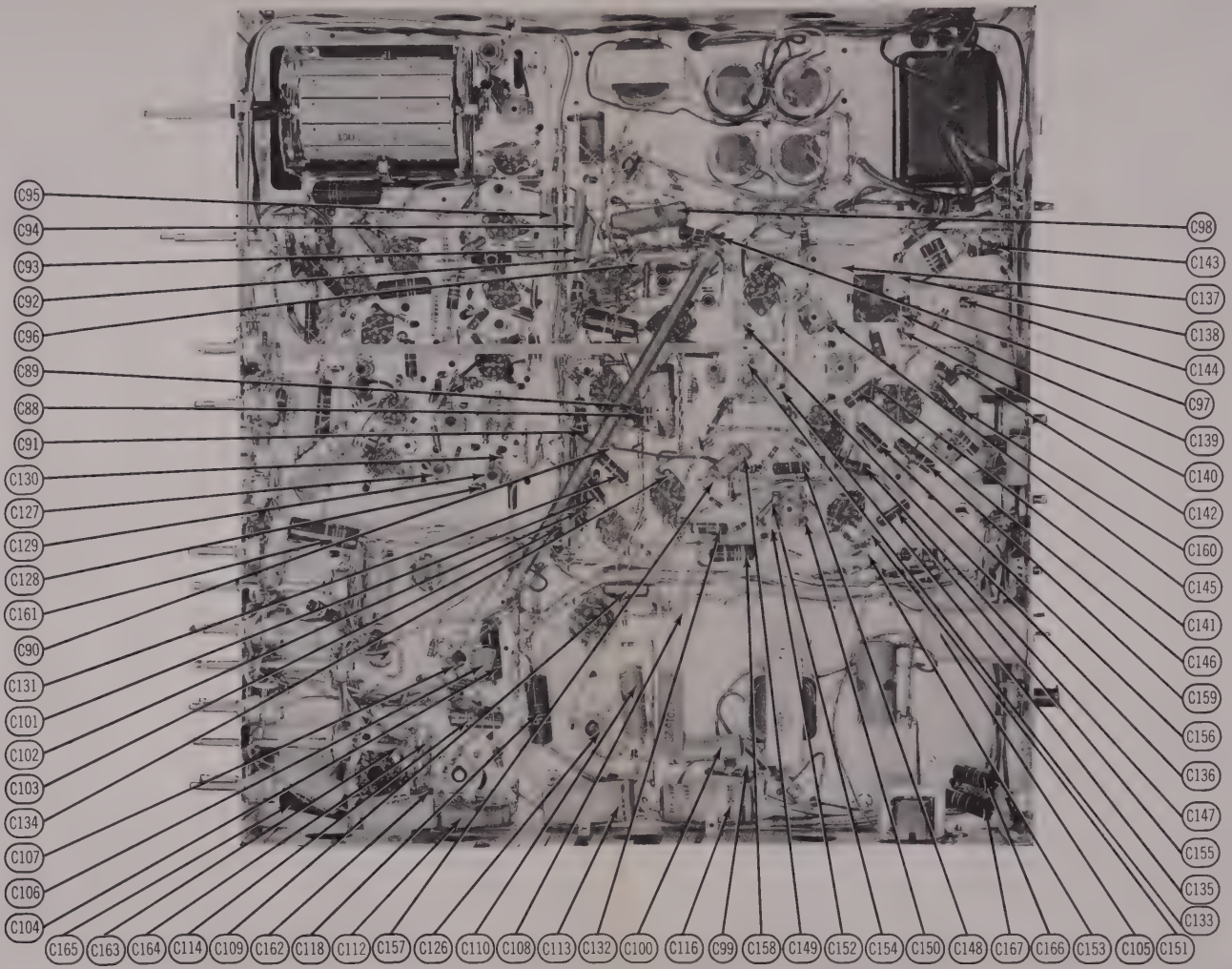
CHASSIS BOTTOM VIEW CAPACITOR IDENTIFICATION (C6-C87)



CHASSIS BOTTOM VIEW RESISTOR IDENTIFICATION (R124-R222)



CHASSIS BOTTOM VIEW RESISTOR IDENTIFICATION (R1-R120)



CHASSIS BOTTOM VIEW CAPACITOR IDENTIFICATION (C88-C167)

MISCELLANEOUS ADJUSTMENTS

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Turn the horizontal drive control (R19) as far clockwise as possible without the presence of vertical white lines or compression near the center of the picture.

Adjust the horizontal centering control (R18) to center picture preferably while viewing a test pattern.

Set the horizontal hold control (R4B) to its mid-range position. Adjust the horizontal lock slug (B1) counter clockwise while switching on and off channel until picture looses sync. Turn B1 clockwise and note the number of diagonal bars just before the picture pulls into sync. There should be less than two bars if the horizontal circuit is operating properly. Continue turning B1 clockwise while switching on and off channel until sync is again lost, then turn B1 counter clockwise and note the point where picture falls into sync. Turn B1 one more half turn counter clockwise.

Adjust the horizontal width slug (B2) for a picture slightly wider than is necessary to fill the picture mask horizontally. Remove 400 MA fuse and connect a 0-500 MA meter across the 400 MA fuse holder and adjust the horizontal linearity slug (B3) for MINIMUM reading on the meter.

HIGH VOLTAGE ADJUSTMENT

Connect DC voltmeter across cathode resistor R149 between pin 1 of 6BK4 (V23) and the 400 volt line.

Adjust the "HV ADJUST" control for .7 volts on the low DC volt scale

Measure the high voltage at the plate cap of V23 using a 30,000 volt probe attached to the voltmeter. If voltage is higher than 25,000 volts, adjust "HV ADJUST" so that it does not exceed 25,000 volts.

COLOR PURITY ADJUSTMENT

Allow 15 minute warm-up period for the receiver and equipment. Check the horizontal linearity with a cross hatch or vertical bar generator and readjust if necessary for good linearity.

Set the horizontal and vertical hold controls for proper sync with an on the air signal.

Switch to an unused channel and connect a dot generator to the receiver following instructions of generator manufacturer. Adjust dot generator for a stable pattern. Do not use vertical or horizontal hold controls on the receiver for this purpose.

Turn all vertical and horizontal amplitude and vertical tilt controls to full counter clockwise position.

Pull all edge magnets to full out position. These are located at the outer rim of the picture tube.

Check position of Convergence Yoke Assembly which is located behind the deflection yoke assembly. The Blue magnet should be directly over the blue gun and the assembly should be located about 2 and 7/8 inches from the front of the picture tube base.

By adjusting the knurled screws on the "Blue, Green and Red positioning magnets", converge the dots at the center of the screen. Do not use the amplitude or tilt controls to converge the dots.

Loosen the two screws at the base of the deflection yoke bracket and slide the assembly back from the bell of the picture tube.

Remove the dot generator connection from the antenna terminals and connect a jumper across the terminals.

Turn the contrast control fully counter clockwise.

Turn the red screen control to the full clockwise position.

Turn the brightness control up to a bright raster. Connect clip leads from the blue and green grids of the picture tube to the chassis.

Rotate the purity magnet or each ring of the magnet until a pure red field is located at the center of the screen. Disregard color contamination at the edges of the screen.

Slide the deflection yoke forward until the maximum overall red screen is obtained over the entire screen. Do not tilt the yoke.

Readjust the purity magnet to obtain the best overall red screen. Tighten the yoke.

To check the blue field, remove the clip lead from the blue grid and connect it to the red grid. Turn the "red screen" down and the "blue screen" control up.

The green field is checked by moving the clip lead from the green grid to the blue grid, turning the "blue screen" down and the "green screen" up. If overall red, blue or green purity cannot be obtained (disregarding slight edge contamination) the purity adjustments should be repeated. If overall red, blue and green purity is still unobtainable, a slight compromise of the colored fields should be made with the red being favored slightly.

Connect the blue and green grids of the picture tube to ground with clip leads. Turn the "red screen" control to the maximum clockwise position. Adjust the edge magnets to eliminate all color contamination from the edge of the picture screen.

Adjust the receiver for a white raster. See "Screen and Background Control Adjustments".

DYNAMIC CONVERGENCE ADJUSTMENTS

Set all amplitude and tilt controls fully counter clockwise. Adjust the Blue, Green and Red positioning magnets located on the Convergence Yoke Assembly to statically converge the dots at the center of the screen. The blue dot may be moved horizontally by adjusting the Blue Beam Corrector Magnet if necessary.

Turn all amplitude and vertical tilt controls up one fourth turn.

Adjust the "Red and Green Horizontal amplitude and tilt" controls until the red and green dots are parallel to each other in a horizontal plane throughout the horizontal row of dots across the screen.

Next, the Blue Horizontal amplitude and tilt controls are used to bring the blue dot into the line with the red and green dots horizontally.

The blue vertical amplitude and tilt controls are then adjusted to position the blue dot so that the separation between the three dots are equal in a vertical direction. These adjustments are made while concentrating on the center vertical line. The red and green vertical amplitude and tilt controls are then adjusted to position the red and green dots so that the center row of vertical dots are spaced equally apart and parallel to each other in a vertical direction.

If necessary, readjust the horizontal amplitude and tilt controls so that the vertical center line of dots are separated equally and are parallel to each other in a horizontal direction.

Carefully inspect all groups of dots as to separation and plane making slight adjustments if necessary.

Using the Red, Blue and Green Positioning Magnets, converge the dots. Only very slight adjustments should be made to correct convergence.

BACKGROUND AND SCREEN CONTROL ADJUSTMENTS.

Set the brightness control slightly above viewing level.

Set Chroma, Contrast, Green screen and background, Blue screen and background and Red Screen controls fully counter clockwise.

Set the Blue background, Green background and Red screen one fourth turn clockwise. Color of raster should now be red. If color is purplish, increase red screen and reduce blue background slightly. If color is yellowish, reduce green background. Rotate the blue screen slowly clockwise until the color of the raster becomes a pale purple. If blue screen has no effect on the color of the raster, turn up the blue background just below the point where the screen starts to turn bluish.

Advance the green screen control until the raster becomes white. If the Green screen control has no effect on the color, turn up the green background control slightly. A slight readjustment of the Red, Green and Blue screen controls may be necessary to produce a good white picture. If the raster still has a color tint after making these adjustments, carefully reduce the screen control relating to the color of the picture color. If the color is a yellowish tint, turn the blue screen up slightly. If the color is cyan (greenish blue), turn up the red screen slightly. If the color is purplish, increase the green screen slightly.

Rotate the contrast control clockwise one fourth turn, reduce the brightness until only the brightest portions of a telecast picture are visable. Do not readjust any screen controls. Adjust only the Blue and Green background controls until the brightest portions of the picture become white.

Turn the brightness control up to normal level.

There should be no color tinting of the picture between low brightness setting and just above normal brightness setting. If tinting occurs at high settings of brightness, the screen controls must be readjusted slightly. If tinting occurs at low brightness settings, the Blue or Green background controls must be readjusted slightly. It is important that the screen and background controls be adjusted properly for a black and white picture as this will affect the coloring of a color telecast.

PROPERTY OF

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT	
V1	RF Amplifier	6BZ7	6BZ7	
V2	Mixer-Oscillator	6U8	6U8	
V3	1st. Video IF Amplifier	6DC6	6DC6	
V4	2nd. Video IF Amplifier	6DC6	6DC6	
V5	3rd. Video IF Amplifier	6DC6	6DC6	
V6	4th. Video IF Amplifier	6CB6	6CB6	
V7	Video Output	12BY7	12BY7	
V8	AGC Keying-Vert. Osc.	6AN8	6AN8	
V9	Sound IF Amplifier	6AU6	6AU6	
V10	Limiter	6AU6	6AU6	
V11	Audio Detector	6BN6	6BN6	
V12	AF Amplifier-AGC Clamper	6AV6	6AV6	
V13	Audio Output	6AQ5	6AQ5	
V14	Sync Separator-Sync Phase Inverter	12AU7	12AU7	
V15	Vert. Output	6BL7GT	6BL7GT	
V16	Horiz. AFC	6AL5	6AL5	
V17	Horiz. Mult.	6SN7GT	6SN7GT	
V18	Horiz. Output	6CB5	6CB5	
V19	Damper	6AU4GT	6AU4GT	
V20	HV Rectifier	3A2	3A2	
V21	Diode Coupler	3A3	3A3	
V22	HV Doubler	3A3	3A3	
V23	HV Regulator	6BK4	6BK4	
V24	Color Killer-1st. Chroma Amplifier	6U8	6U8	
V25	Burst Keying-Chroma Sync Phase Detector	6BJ7	6BJ7	
V26	2nd. Chroma Amplifier	6CL6	6CL6	
V27	Chroma Ref. Osc. Control-Chroma Ref. Osc.	6U8	6U8	
V28	R-Y Demodulator-B-Y Demodulator	12BH7	12BH7	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA				NOTES
	AIRLINE PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V29	21AXP22			21AXP22	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	200	250	25E94	RE1027	C017	FP126	TM-200-250	S-160 / MT-2540	R2067
C2	200	250	25E94	RE1027	C017	FP126	TM-200-250	S-160 / MT-2540	R2067
C3	90	450	25E95	AFH1-57	A057	FP187	TM-90-475	S-305	TVL-1850
C4	200	250	25E96	RE1027	C017	FP126	TM-200-250	S-160 / MT-2540	R2067
C5	1000	15	25E90	PRS15V1000	BRH1510	TC1501	TD-1000-15	S-020	TVA-1163
C6	2	25	25E88	PRS50V2	BBR2-50T	TC302	TD-2-25	MT-0502	TVA-1201
C7	10	25	25E8	PRS25V10	BR102	TC22	TD-10-25	FM-0210	TVA-1204
C8A	▲10	450	25E97	AFH4-10	D048	FP424	TM-4018	Q-330	TVL-4723
B	10	25							
C	▲10	450							
D	■10	450							
C9	4	150	25E99	PRS150V4	BR415	TC40	TD-4-150	FM-1504	TVA-1402
C10	10	450	25E70	PRS450V10	BR1045	TC72	TD-10-450	FM-4510	TVA-1705
C11	10	25	25E8	PRS25V10	BR102	TC22	TD-10-25	FM-0210	TVA-1204
C12	10	450	25E70	PRS450V10	BR1045	TC72	TD-10-450	FM-4510	TVA-1705
C13	10	450	25E70	PRS450V10	BR1045	TC72	TD-10-450	FM-4510	TVA-1705
C14	4	50	25E98	SRE50V5	BBR4-50T	TC30	TD-4-50	MMT-0505	TVA-1303
C15	25	50	25E101	PRS50V25	BR255	TC36	TD-25-50	FM-0525	TVA-1306
C16	500	3	25E89 (Note 1)	PRS6V500	BRH610 * / BRH610 *	TC412	TD-500-3NP	MT-06100 * / MT-06100 *	R2195
C17	4	150	25E99	PRS150V4	BR415	TC40	TD-4-150	FM-1504	TVA-1402
C18	10	25	25E8	PRS25V10	BR102	TC22	TD-10-25	FM-0210	TVA-1204
C19	10	25	25E8	PRS25V10	BR102	TC22	TD-10-25	FM-0210	TVA-1204
C20	100	6	25E102	SRE6V100	BBR100-6T	TC2501	TD-100-6	MTH-0610	TVA-1101

Note 1. Item C16 is a non-polarized unit.
* Connect negative leads together.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C21	3-9				829-10					
C22	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C23	3			NP0-SI3	TCZ-3R3	Z007	NP0A-030	ZT-553	5TCCB-V33	
C24	.5-3				829-3		3115-01-0R5	CT565A		
C25	47			BPD-000047	DD-470	G033	831-470	UC-5447	5GA-Q47	
C26	1.5			NP0-SI1.5	TCZ-1R5	Z004	NP0A-1R5	ZT-5515	5TCCB-V15	
C27	800									
C28	47			EF-00005	MFT-50					
C29	.5-3				829-3		3115-01-0R5	CT565A		
C30	5									
C31	10									
C32	.5-3				829-3		3115-01-0R5	CT565A		
C33	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C34	800									
C35	220			BPD-00022	DD-221	G051	811-221	UC-5322	5GA-T22	
C36	68			BPD-000068	DD-680	G038	811-680	UC-5468	5GA-Q68	
C37	470			BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C38	800									
C39	800									
C40	82	500		1469-000082	TCZ-82	5R5Q82	NP0-337-820		MS-482	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C41	60	500		1469-00006	TCZ-62	5R5Q62	NP0-337-620		MS-46	
C42	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C43	820		23E4000-32	SI820	D6-821	K067	811-821		5GA-T82	
C44	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C45	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	820		23E4000-32	SI820	D6-821	K067	811-821		5GA-T82	
C47	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C48	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C49	820		23E4000-32	SI820	D6-821	K067	811-821		5GA-T82	
C50	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C51	680		23E4000-28	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C52	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C53	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C54	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C55	82	500		1469-000082	TCZ-82	5R5Q82	NP0-337-820		MS-482	
C56	8.2		23E4001-30	NP0-SI8.2		Z016	NP0A-8R2			
C57	6.8		23E4001-17	NP0-SI6.8	TCZ-6R8	TZ08	NP0A-6R8	ZT-5568	5TCCB-V68	
C58	220		23E4001-28	N750-SI220	TCN-220	TN30	NP0-335-221		5TCU-T22	
C59	.0015	400	23E3405	SI1500	D6-152	CUB6D15	GP2L-152	PT6215	6TM-D15	
C60	.0033	400	23E3407	SI3300	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	
C61	.1	400	23E3616	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C62	.01	600	23E3610	BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C63	.01	600	23E3610	BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C64	470	2000	23E4003-6	HVD-30-470	DD30-471	V2T47	3KV-471	DC30347	20GA-T47	
C65	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C66	10000		23E4004-17	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C67	.47	200	23E3220	P288N-47		CUB2P47		PT4047	2TM-P47	
C68	5.1		23E4001-16	NP0-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C69	10		23E4001-18	NP0-SI10	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C70	10		23E4001-18	NP0-SI10	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C71	15		23E4001-19							
C72	5000		23E4004-15	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C73	47		23E4000-14	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C74	100	500	23E3500-32	1469-0001	D6-101	5R5T1	801-101	MCB235	MS-31	
C75	10000		23E4004-17	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C76	10000		23E4004-17	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C77	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C78	15		23E4001-19							
C79	220		23E4000-22	SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C80	.1	400	23E3416	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C81	.01	400	23E3410	BPD-01	DD-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C82	680		23E4000-28	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C83	.0047	400	23E3408	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C84	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C85	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C86	.047	600	23E3614	BPD-05	DF-503	CUB6S47		PT6147	6TM-S47	
C87	.0047	600	23E3608	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C88	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C89	330		23E4000-24	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C90	47		23E4000-14	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C91	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C92	.0022	400	23E3406	SI2200	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C93	.0047	400	23E3408	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C94	.0047	400	23E3408	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C95	.0047	400	23E3408	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C96	.1	600	23E3616	P688N-1	DF-104	CUB6P1		PT601	6TM-P1	
C97	.022	400	23E3412	BPD-02	DD-203	CUB4S22	817-02	PT4122	4TM-S22	
C98	.25	600	23E3618	P688N-25		CUB6P25		PT6025	6TM-P25	
C99	1000	1500	23E4003-7	HVD-15-1000	DD30-102	V2D1	1R5KV-102	DC3021	20GA-D1	
C100	.25	600	23E3618	P688N-25		CUB6P25		PT6025	6TM-P25	
C101	.001	400	23E3404	SI1000	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C102	.001	400	23E3404	SI1000	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C103	.0047	400	23E3408	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C104	.047	600	23E3614	BPD-05	DF-503	CUB6S47		PT6147	6TM-S47	
C105	3900	500	23E4005-64	1464-0039		1R5D39		MCB463	MS-239	
C106	330	500	23E3500-77	1469-00033		5R5T33			MS-333	
C107	18		23E4001-25		TCZ-18	TZ12	NP0K-180			
C108	470	500	23E3500-40	1469-00047	D6-471	5R5T47	811-471	MCB245	MS-347	
C109	.01	600	23E3610	BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C110	.1	600	23E3616	P688N-1	DF-104	CUB6P1		PT601	6TM-P1	
C111	.22	600	23E622	P688N-22		CUB6P22		PT6022	6TM-P22	
C112	.25	600	23E622	P688N-25		CUB6P25		PT6025	6TM-P25	
C113	.25	1000	23E4006	P1089-25					PX-21	
C114	.047	600	23E3614	BPD-05	DF-503	CUB6S47		PT6147	6TM-S47	
C115	680		23E4000-28	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C116	.25	1000	23E4006	P1089-25					PX-21	
C117	.25	1000	23E4006	P1089-25					PX-21	
C118	.47	200	23E3220	P288N-47		CUB2P47		PT4047	2TM-P47	
C119	360	2500								
C120	360	2500								
C121	150			HVD-30-150	DD30-151	V3T15	3KV-151	DC30315	30GA-T15	
C122	1200	13000	23E2029-5							
C123	1200	15000	23E2029-5							
C124	500	12500								
C125	500	30000	23E2029-4	UV-503	TV8-503	MMU30T5			30DK-T5	
C126	10000		23E4004-17	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C127	82	500		1469-000082	TCZ-82	5R5Q82	NP0-337-820		MS-482	
C128	10		23E4001-18	NP0-SI10	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C129	120	500		1469-00012	TCZ-120	5R5T12	NP0-333-121		MS-312	
C130	100		23E4000-31	1469-0001	TCZ-100	TZ30	NP0-337-101	ZT-531	5TCC-T1	
C131	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C132	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C133	5000		23E4004-15	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C134	10000		23E4004-17	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C135	5000		23E4004-15	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C136	820	500	23E3500-45	1464-00082		1R5T82	811-821		MS-382	
C137	5000		23E4004-15	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C138	1.5-7		24E72		822-EZ		T52A-1.5	ST-5515-Z		
C139	15		23E4001-19							
C140	27		23E4001-26		TCN-27	TN08	N750K-270			
C141	120		23E4001-27	N750-SI120	TCN-120	TN-24	N750-337-121		5TCU-T12	
C142	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C143	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C144	.01	400	23E3410	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C145	22		23E4001-29	NP0-SI22	TCZ-22	TZ14	NP0K-220		5TCC-Q22	

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C146	001	600	23ES404	5U1000	D6-102	CUBD1D	GP2L-102	PT921	6TM-D1	
C147	001	600	23ES404	5U1000	D6-102	CUBD1D	GP2L-102	PT921	6TM-D1	
C148	.01	400	23ES410	BPD-01	D6-103	CUBS1	GP3-333-103	PT411	4TM-S1	
C149	.25	100	23K123	PT288N-25		CUBZP25		PT4025	6SP19	
C150	2		23XE001-34	BPD-2T2.2	TCZ-2R2	CUBZ2D	NP0A-2R2		5TCZB-V22	
C151	10000		23XE004-17	BPD-01	DD-103	KD03	811-01	DC-511	5HK-51	
C152	5000		23XE004-15	BPD-005	DD-502	KD50	811-005	DC-525	5HK-05	
C153	5000		23XE004-15	BPD-005	DD-502	KD50	811-005	DC-525	5HK-05	
C154	83		23XE4001-31	1469-000083	TCZ-82	TZ3S	NPO-337-S20		MS-483	
C155	.01	400	23XE3410	BPD-01	D6-103	CUBS1	GP3-333-103	PT411	4TM-S1	
C156	.001	400	23XE3404	5U1000	D6-102	CUBD1D	GP2L-102	PT921	6TM-D1	
C157	5000		23XE004-15	BPD-005	DD-502	KD50	811-005	DC-525	5HK-05	
C158	047	400	23XE3414	BPD-05		CUBS47		PT4147	4TM-S47	
C159	033	400	23XE3412	BPD-03	DD-303	CUBS33	817-03	PT4123	4TM-S33	
C160	033	400	23XE3412	BPD-03	DD-303	CUBS33	817-03	PT4123	4TM-S33	
C161	22	400	23XE3418	P488N-22		CUBP23		PT4023	4TM-P22	
C162	2200	500	23XE4005-58	1464-0022		UR5D22			MS-222	
C163	2200	500	23XE4005-58	1464-0022		UR5D22			MS-222	
C164	2200	500	23XE4005-58	1464-0022		UR5D22			MS-222	
C165	.47	200	23XE3420	P288N-47		CUBZP47		PT4047	2TM-P47	
C166	.047	600	23XE3414	BPD-05	DF-503	CUBS47		PT6147	6TM-S47	
C167	.047	600	23XE3414	BPD-05	DF-503	CUBS47		PT6147	6TM-S47	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	AIRLINE PART No.	CENTRALAB PART No.	CAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	23E1133		RTV-580			Brightness (Panel)
B	1Meg	½						Volume & Switch tapped at 60kΩ and 40kΩ (Rear)
R2A	1Meg	½	23E1136	B-59	A47-1Meg-S	QU-137	U-54	Tone
B	Shaft		Not Req.	AK-4	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	500Ω	½	23E1137	F1-3				Contrast tapped at 325Ω (Panel)
B	2000Ω	½		R2-9				Chroma (Rear)
R4A	1Meg	½	23E1146	F1-51	* QJ-1000	UF1EL	Centralab	Vert. Hold (Panel)
B	10kΩ	½		R2-23		UR1EL	Carostat	Horiz. Hold (Rear)
R5A	1000Ω	½	23E1138	AB-5	A47-1000-S	QU-108	U-4	Blue Horiz. Amplitude
B	Shaft		Not Req.	AK-4	[illegible]	Not Req.	Not Req.	Attach to R5A.
R6A	1000Ω	½	23E1138	AB-5	A47-1000-S	QU-108	U-4	Green Horiz. Amplitude
B	Shaft		Not Req.	AK-4	KS6-3	Not Req.	Not Req.	Attach to R6A.
R7A	1000Ω	½	23E1138-2	AB-5	A47-1000-S	QU-108	U-4	Red Horiz. Amplitude
B	Shaft		Not Req.	AK-4	KS8-5	Not Req.	DS-36	Attach to R7A.
C	Coupler		Not Req.	Not Req.	Not Req.	C3	Not Req.	Attach to R7B.
R8A	10000Ω	½	23E140					Blue Vert. Ampl. (Rear)
B	2000Ω	½	[illegible]					Green Vert. Till (Panel)
R9A	1000Ω	½	[illegible]					Green Vert. Amplitude (Rear)
B	2000Ω	½						Red Vert. Till (Panel)
R10A	10000Ω	½	23E140-2					Red Vert. Amplitude (Rear)
B	2000Ω	½						Blue Screen (Panel)
R11A	1Meg	½	23E143					Blue Background (Rear)
B	500kΩ	½						Green Screen (Panel)
R12A	1Meg	½	23E143					Green Background (Rear)
B	500kΩ	½						Red Screen
R13A	1Meg	½	23E143	AB-59	A47-1Meg-S	QU-137	U-54	Attach to R13A.
B	Shaft		Not Req.	AK-4	KS8-5	C3	DS-36	Vert. Size
R14A	1Meg	½	23E145	AB-59	A47-1Meg-S	QU-137	U-54	Attach to R14A.
B	Shaft		Not Req.	AK-4	KS8-5	Not Req.	Not Req.	Vert. Linearity-WireWound
R15A	1000Ω	2	23E144		A43-1000	WR5-1000	RU00L	Vert. Linearity-WireWound
B	Shaft		Not Req.		KS8-5	Not Req.	Not Req.	Attach to R15A.
R16A	1Meg	½	23E185					Color Gate (Panel)
B	500kΩ	½						AGC (Rear)
R17A	200Ω	2	23E147					Vert. Centering (wire wound) (Panel)
B	200Ω	2						(Rear)
R18A	100Ω	2	23E148					Horiz. Centering (wire wound) (Panel)
B	100Ω	2						(Rear)
R19A	5000Ω	½	23E149	AB-10	A47-5000-S	QU-114	U-14	Horiz. Drive
B	Shaft		Not Req.	AK-1	FS3-1	Not Req.	Not Req.	Attach to R19A.
R20A	500KΩ	½	23E155	AB-59	A47-500K-S	QU-133	SU-50	High Voltage
B	Shaft		Not Req.	AK-1	FS5-1	RQ	Not Req.	Attach to R20A.
R21	5Meg	½	23E154					Focus
R22	600Ω	2	23E122		* 39-500			Buzz Wire Wound
	with 100Ω stop							

* Connect a 100Ω resistor in series with the terminal and the lead connecting to the same terminal of the control.
• Concentrikit Equivalent: K-15 Kit, Base Elements and Shafts; B11-157 & P17-024 (Panel)
B11-116 & R1-108 (Rear)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R23	33kΩ	½	23ES233-[illegible]	BTS-22K	
R24	47kΩ	½	23ES247-[illegible]	BTS-47K	
R25	22Ω	½	23E2220-[illegible]	BTS-22	
R28	820kΩ	½	23ES282-[illegible]	BTS-[illegible]	
R27	470kΩ	½	23E2474-[illegible]	BTS-470K	
R29	470Ω	½	23E471K-[illegible]	BTS-470	
R30	10kΩ	½	23E1003-[illegible]		
R32	3300Ω	½	23E332K-[illegible]		
R31	6800Ω	½	23E682K-[illegible]		
R33	100kΩ	½	23E104K-[illegible]		
R34	100kΩ	½	23E104K-[illegible]		
R34	22kΩ	½	23E223K-[illegible]		
R35	15kΩ	½	23E153K-[illegible]		
R36	8200Ω	½	23E822K-[illegible]	BTS-8200	
R37	10kΩ	½	23E103K-[illegible]	BTS-10K	
R38	10Meg 5%	½	23E106J-[illegible]	BTS-10Meg 5%	
R39	1.2Meg	½	23E125J-[illegible]	BTS-L 2Meg	
R40	470kΩ 5%	½	23E474J-[illegible]	BTS-470K 5%	
R41	4700Ω	½	23E472K-[illegible]	BTS-4700	
R42	47kΩ	½	23E473K-[illegible]	BTS-47K	
R43	4700Ω	½	23E472K-[illegible]	BTS-4700	
R44	2700Ω	½	23E272K-[illegible]	BTA-2700	
R45	56Ω	½	23E560K-[illegible]	BTS-56	
R46	470Ω	½	23E471K-[illegible]	BTS-470	
R47	39kΩ	½	23E393K-[illegible]		
R48	47kΩ	½	23E473K-[illegible]	BTS-47K	
R49	3700Ω	1	23E372K-1	BTA-3700	
R50	4990Ω	2	23E4990K-[illegible]	BTS-58	
R51	4700	2	23E471K-[illegible]	BTS-470	
R52	39kΩ	2	23E393K-[illegible]		
R53	470Ω	2	23E471K-[illegible]	BTS-470	
R54	47kΩ	2	23E473K-[illegible]	BTS-47K	
R55	2700Ω	2	23E272K-[illegible]	BTA-2700	
R56	56Ω	2	23E560K-[illegible]	BTS-56	
R57	4700Ω	2	23E472K-[illegible]		
R58	470Ω	2	23E471K-[illegible]	BTS-470	
R59	330Ω	2	23E331K-[illegible]	BTS-330	
R60	10kΩ	2	23E103K-[illegible]	BTS-10K	
R61	4100Ω 1%	2	23E1037-4		
R62	39kΩ	2	23E393K-[illegible]	BTS-39K	
R63	33kΩ	2	23E333K-[illegible]	BTS-33K	
R64	8500Ω	10	23E1022-2		
R65	120kΩ	2	23E124K-1	BTA-120K	
R66	2200Ω	1	23E222K-[illegible]	BTS-2200	
R67	15kΩ	2	23E153K-[illegible]	BTS-15K	
R68	3900Ω	2	23E392K-[illegible]	BTS-3900	
R69	560Ω	2	23E561K-[illegible]	BTS-560	
R70	470	2	23E470K-[illegible]	BTS-47	
R71	220kΩ	2	23E224M-[illegible]	BTS-220K	
R72	270kΩ	2	23E274M-[illegible]	BTS-270K	
R73	180kΩ 5%	2	23E184J-[illegible]	BTS-180K 5%	
R74	68kΩ	2	23E683K-[illegible]	BTS-56K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R75	33kΩ	½	23E333K-1	BTS-33K	
R76	10kΩ	½	23E103K-[illegible]	BTS-10K	
R77	4700Ω 5%	½	23E472J-[illegible]	BTS-4700 5%	
R78	100kΩ	½	23E104K-[illegible]	BTS-100K	
R79	33kΩ	2	23E333K-[illegible]	BTS-33K	
R80	47kΩ	½	23E473K-[illegible]	BTS-47K	
R81	33kΩ	½	23E333K-[illegible]	BTS-33K	
R82	22kΩ	½	23E223K-[illegible]	BTS-22K	
R83	68kΩ	½	23E683K-[illegible]	BTS-68K	
R84	220kΩ	½	23E224K-[illegible]	BTS-220K	
R85	220kΩ	½	23E234K-[illegible]	BTS-220K	
R86	33kΩ	½	23E333K-[illegible]	BTS-33K	
R87	1Meg	½	23E105K-[illegible]	BTS-1Meg	
R88	47kΩ	½	23E473K-[illegible]	BTS-47K	
R89	27kΩ	½	23E273K-[illegible]	BTS-27K	
R90	6.7Meg	½	23E675M-[illegible]	BTS-6.7Meg	
R91	330kΩ	½	23E334M-[illegible]	BTS-330K	
R92	22Ω	½	23E221K-[illegible]	BTS-220	
R93	150kΩ	½	23E151K-[illegible]	BTS-150K	
R94	470kΩ	½	23E474K-[illegible]	BTS-470K	
R95	3000Ω	10	23E3016-26	PW10-3000	
R96	4700Ω	½	23E472K-[illegible]	BTS-4700	
R97	270Ω	½	23E271K-1	BTA-270	
R98	470kΩ	½	23E474M-[illegible]	BTS-470K	
R99	2.7Meg	½	23E275M-[illegible]	BTS-2.7Meg	
R100	100kΩ	½	23E104K-[illegible]	BTS-100K	
R101	100kΩ	½	23E104K-[illegible]	BTS-100K	
R102	39kΩ	½	23E393K-[illegible]	BTS-39K	
R103	1Meg	½	23E105K-[illegible]	BTS-1Meg	
R104	470kΩ	½	23E473K-[illegible]	BTS-470K	
R105	1000Ω	½	23E102K-[illegible]	BTS-1000	
R106	3900Ω	½	23E392K-[illegible]	BTS-3900	
R107	22kΩ	½	23E223K-[illegible]	BTS-22K	
R108	8200Ω	½	23E822K-[illegible]	BTS-8200	
R109	1000Ω	½	23E102K-[illegible]	BTS-1000	
R110	2.2Meg	½	23E225K-[illegible]	BTS-2.2Meg	
R111	330kΩ	½	23E334K-[illegible]	BTS-330K	
R112	100Ω	½	23E101K-[illegible]	BTS-100	
R113	220Ω	5	23E221K-[illegible]	BTS-220	
R114	100Ω	½	23E101K-[illegible]		
R115	1Meg	½	23E105K-[illegible]	BTS-1Meg	
R116	820Ω	½	23E822K-[illegible]	BTS-820	
R117	100Ω	½	23E101K-[illegible]	BTS-100	
R118	2.2Meg	½	23E225K-[illegible]	BTS-2.2Meg	
R119	330Ω	½	23E331K-1	BTA-330	
R120	100Ω	½	23E101K-[illegible]	BTS-100	
R121	220Ω	5	23E221K-[illegible]	BTS-220	
R122	1000Ω	½			
R123	1000Ω	½			
R124	120Ω	½	23E121K-[illegible]		
R125	2.68MΩ	½	23E684M-[illegible]	BTS-6.8Meg	
R126	4.7Meg	½	23E475M-[illegible]	BTS-4.7Meg	
R127	120kΩ 5%	½	23E124J-[illegible]	BTS-120K 5%	
R128	120kΩ 5%	½	23E124J-[illegible]	BTS-120K 5%	
R129	470kΩ	½	23E474M-[illegible]		
R130	10000Ω 5%	½	23E1062-1		
R131	100kΩ 5%	½	23E104J-[illegible]		
R132	120kΩ	½	23E124J-[illegible]		
R133	1800Ω 5%	½	23E182J-[illegible]		
R134	470Ω	½	23E471K-[illegible]	BTS-470	
R135	680Ω	½	23E682K-[illegible]		
R136	100Ω	½	23E101K-[illegible]		
R137	470Ω	½	23E474K-[illegible]		
R138	100Ω	½	23E101K-[illegible]		
R139	12kΩ	10	23E1018-29	1 3AA-12K	
R140	470Ω	½	23E471K-[illegible]		
R141	10kΩ	½	23E103K-[illegible]		
R142	100kΩ	½	23E103K-[illegible]		
R143	10kΩ	½	23E103K-[illegible]		
R144	2.7kΩ	2	23E1037-		
R145	8.6kΩ	2	23E1037-3		
R146	50kΩ	2	23E1037-3		
R147	1.2kΩ	2	23E125K-[illegible]		
R148	1.5kΩ	2	23E715M-[illegible]		
R149	1000Ω	½	23E102K-[illegible]		

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	AIRLINE PART No.	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117VAC ③ 3.55A	188V Tap ⑤ 188V ⑤ 80A	6.3V ⑤ 14.2A	6.3A ⑤ 1.8A	22E110					

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	AIRLINE PART No	Halldorson PART No	Merit PART No	RCA TYPE No.	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T2	Vert. Osc. Trans.	23E1108	B6702	A-3005	209T①	V405	A-8125	28A03	A-97X	
T3	Horiz. Output Trans.	23E1107								
T4	Vert. Output Trans.	23E1108	Z1900②	A-3823		V307	A-8144	26872	A-106X	
T5A	Yoke-Horiz. (12MH)	23E1174 ⑥								
B	Vert. (205MH)									
T6	Horiz. Lin. Coil (.5-1.64MH)	23E1118	RF804 ⑦	MWC-2	206R①	301R4 ①	WC-7①	WC-23	WC-13④⑦	
T7	Width Coil (1.2-1.64MH)	23E1131	RF804 ⑦		206R①	301R4 ①	WC-7①	WC-23	WC-13④⑦	
T8	Horiz. APC Pulse Trans.	23E1106								
T9	Vert. Centering Choke	23E1187								
T10	Horiz. Centering Choke (4-18MH)	23E1116	RF800④ ⑤	MWC-11④	212R1④	201R18④	WC-5④	WC-18④	WC-13④ ⑦④	
T11	Horiz. Centering Choke	23E1117								
T12	Horiz. Convergence									
T13A	Phase Coil (1.4-1.64MH)	23E1223	RF804 ⑦	MWC-2	206R①	301R4 ①	WC-7	WC-23	WC-13 ⑦④	
B	Green } Dynamic	23E1175 ⑦								
C	Red } Convergence									
	Yoke Assy.									

TRANSFORMERS (SWEEP CIRCUITS) cont

ITEM No.	USE	AIRLINE PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T14	Dynamic Convergence Inductor Assy.	23E1103						

① Drill new mounting hole(s).
② Use 8 to 1 horiz. ratio.
③ Use red and blue terminals.
④ Adjust to maximum inductance.
⑤ Use terminals #1 and #3.
⑥ Includes capacitors C128, C130 and C131, resistors R123, R133 and R140.
⑦ Includes control magnet, Sectimal part #P-1980 (2 used).

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	AIRLINE PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T15	6KΩ	3-4Ω	22E102	21006①	A2935②	A3830	22359	8-5X	① Drill One New Mounting Hole. ②Tape Up Center Tap

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	AIRLINE PART No.	OHAM PART No.	RCA TYPE No	NOTES
SP1	10"	PM	3-4Ω	1E43-4	10A31	23681	
SP2	5"	PM	3-4Ω	1E58-3	5A07	20552	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0Ω CT	0Ω	31M-013-31C				Channel 2
B	Ant. Coil	0Ω CT	0Ω	31M-013-32C				Channel 3
C	Ant. Coil	0Ω CT	0Ω	31M-013-47C				Channel 4
D	Ant. Coil	0Ω CT	0Ω	31M-013-52C				Channel 5
F	Ant. Coil	0Ω CT	0Ω	31M-013-6UC				Channel 6
G	Ant. Coil	0Ω CT	0Ω	31M-013-7UC				Channel 7
H	Ant. Coil	0Ω CT	0Ω	31M-013-8UC				Channel 8
I	Ant. Coil	0Ω CT	0Ω	31M-013-9UC				Channel 9
J	Ant. Coil	0Ω CT	0Ω	31M-013-10UC				Channel 10
K	Ant. Coil	0Ω CT	0Ω	31M-013-11UC				Channel 11
L	Ant. Coil	0Ω CT	0Ω	31M-013-12UC				Channel 12
L2	Mext. Coil	0Ω		31M-013-13UC				Channel 13
L3A	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-3UC				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-3UC				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-4UC				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-5UC				Channel 5
F	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-6UC				Channel 6
G	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-7UC				Channel 7
H	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-8UC				Channel 8
I	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-9UC				Channel 9
J	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-10UC				Channel 10
K	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-11UC				Channel 11
L	RF, Mixer Grid & Osc. Coils	0Ω		31M-113-12UC				Channel 12
L4	Fil. Choke	0Ω		31M-113-13UC				Channel 13
L5	Conv. Plate	.1Ω						
L6	47.25MC Trap	0Ω		30E1083				Tapped
L7	41.25MC Trap	0Ω		30E1084				Tapped
L8	1st. Video IF			30E1082				Tapped
L9	Fil. Choke	0Ω		30E1093	19-1001		4804	1.5Ω
L10	2nd. Video IF	.1Ω	.1Ω	30E1090	17-4533	TV-190	6349	
L11	Fil. Choke	0Ω		30E1092	19-1001		4804	1.5Ω
L12	3rd. Video IF	.1Ω	.1Ω	30E1091	17-4533	TV-190	6394	
L13	Fil. Choke	0Ω		30E1092	19-1001		4804	1.5Ω
L14	Fil. Choke	0Ω		30E1092	19-1001		4804	1.5Ω
L15	4th. Video IF	.1Ω	.1Ω	30E1088	17-4534	TV-190	6349	
L16	Fil. Choke	0Ω		30E1092	19-1001		4804	1.5Ω
L17	RF Coil	3.2Ω			19-1006		6613	11 Microhenries
L18	Lenimance Detector	.2Ω		30E1089				Includes (3) series peaking coils, 330Ω resistor and trap Tapped
L19	41.25MC Trap	0Ω		30E1084				
L20	Series Peaking Coil	10Ω		30E1263-13	19-4001 ⑧		6154 ⑧	110 Microhenries, wound on 1EE3 resistor
L21	Series Peaking Coil	10.5Ω		30E1106				180 Microhenries
L22	4.5MC Trap	.45ΩCT		30E1090				
L23	Shunt Peaking Coil	10.5Ω		30E1098				230 Microhenries, wound on 1Meg resistor
L24A	Series Peaking Coil	7.5Ω		30E1086				485 Microhenries
B	Shunt Peaking Coil	8.2Ω						600 Microhenries

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L25	Shunt Peaking Coil	27Ω		20E363-6	19-5100		4642 ▲	1070 Microhenries, wound on 1Meg resistor
L26	RF Choke	2.3Ω			19-1005		4612	11 Microhenries
L27	Series Peaking Coil	.9Ω		20E1086				5.7 Microhenries
L28	1st. Sound IF	4.2Ω		20E1088				
L29	2nd. Sound IF	.6Ω	.6Ω	20E1036				
L30	Quadrature Coil	4.6Ω		20E1037			1470	
L31	4.5MC Trap	1Ω CT		20E1090				
L32A	4.5MC Trap	4.8Ω		20E1091				
B	4.1MC Trap	.8Ω						
L33	Shunt Peaking Coil	27Ω		20E363-6			4642 ▲	1070 Microhenries, wound on 1Meg resistor
L34	Chroma Interstage Transformer	5.5Ω	1.9Ω	20E1103				
L35	2nd. Chroma Amplifier Plate Coil	15Ω		20E1110				
L36	7.2MC Trap	2.8Ω		20E1140				
L37	Burst Take-off Coil	1.8ΩCT		20E1112				Includes 10KΩ resistor
L38	Series Peaking Coil	3.8Ω		20E1087				Wound on 1Meg Resistor
L39	Shunt Peaking Coil	27Ω		20E363-6			4642 ▲	1070 Microhenries, wound on 1Meg resistor
L40	Chroma Reference Osc. Plate Coil	2.9Ω	.6Ω	20E1105				Tertiary winding #1-.4Ω Tertiary winding #2-.7Ω
L41	Phase Shift Coil	1.1ΩCT		20E1115				
L42	Demodulator Driver Trans.	3.2Ω	3.2Ω *	20E1104				* Tapped @ 2.3Ω
L43	Series Peaking Coil	14Ω		20E1111	19-4950		4652	1010 Microhenries
L44	Series Peaking Coil	14Ω		20E1111	19-4950		4652	1010 Microhenries
L45	Series Peaking Coil	14Ω		20E1111	19-4950		4652	1010 Microhenries
L46	RF Choke	2.3Ω			19-1005		4612	11 Microhenries
L47	RF Choke	1.1Ω			19-6033	TV-180	6176	33 Microhenries

■ Parallel with 15KΩ resistor.
▲ Parallel with 1Meg resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L48	97Ω		20E831	19-1576	TV-163	6210			HS-5	

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L49	.400A	38Ω	1.1HY	22E109					
L50	.110A	38Ω	1.1HY	22E109	C5040 ①	C2974	C2327 ①	26C41 ①	C21X

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA AIRLINE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.400ADC	57E16-2C			8S500		509	
M2	.510ADC	57E16-3C			9S750		609	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA AIRLINE PART No. FUSE	AIRLINE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M3	1" Piece #26 Wire							
M4	2"Piece #26 Wire							
M5	N	4/10A 125V	40E7-6		333.400 (N 4/10A)	346009	N 4/10	HN 3/10-1/2
M6	N	5A 125V	40E8-12	55E57	333005. (N5A)	346019	N5	HN3½-5

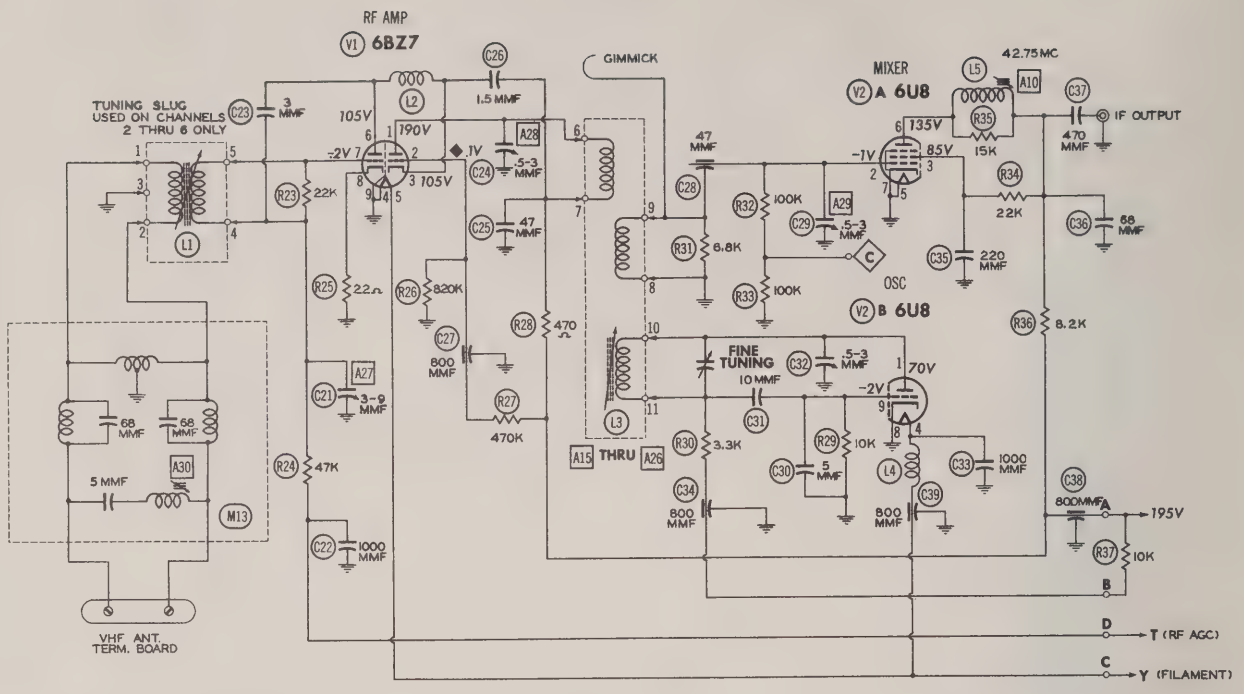
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA AIRLINE PART No.	SYLVANIA PART No.	NOTES
M7	CK-706A	CK-706A	1N60	Video Det. (Pigtail)
M8	CK-706A	CK-706A	1N60	Sound & Chroma Det. (Pigtail)
M9	1N67	1N67	1N67	Chroma Bias Clamper (Pigtail)

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M10	Dial Light	40E2	#44
M11	Tuner	20E1079	
M12	Variable Cap.	24E69	Hue Control (Air Trimmer: 5-25MMF.)
M13	Trap	31K-225-816C	VHF Ant. Input Filter.
M14	Delay Line	20E1119	Luminance Channel.
M15	3.579545 MC Osc. Assembly	20E1114	Includes Coil, Capacitor, & 3.58MC Crystal (Crystal Part #95E3-2).
M16	Magnet	62E11	Blue Beam Lateral Corrector.
M17	Magnet	62E10	Purity
M18	Magnet	P-1081	Picture Tube Rim Purity (8 Used).
M19	Connector	20E1197	High Voltage - Includes 3-22KΩ High Voltage Filter Resistors
	Trimmer Cap.	24E71	Neutralizing (50-380MMF.).
	Trimmer Cap.	24E70	Red Horiz. Tilt (50-380MMF.).
	Trimmer Cap.	24E70	Green Horiz, Tilt (50-380MMF.).
	Trimmer Cap.	24E70	Blue Horiz. Tilt (50-380MMF.).
	Knob	37E89	Fine Tuning.
	Knob	37E90-5	Channel Selector.
	Knob	37E113	Hue & Tone.
	Knob	37E113-2	Horiz. Hold & Chroma.
	Knob	37E114	Vertical Hold & Contrast.
	Knob	37E86-5	Brightness
	Knob	37E85-7	On-Off-Volume.
	Safety Glass	9E45-16	
	Mask	36E106	



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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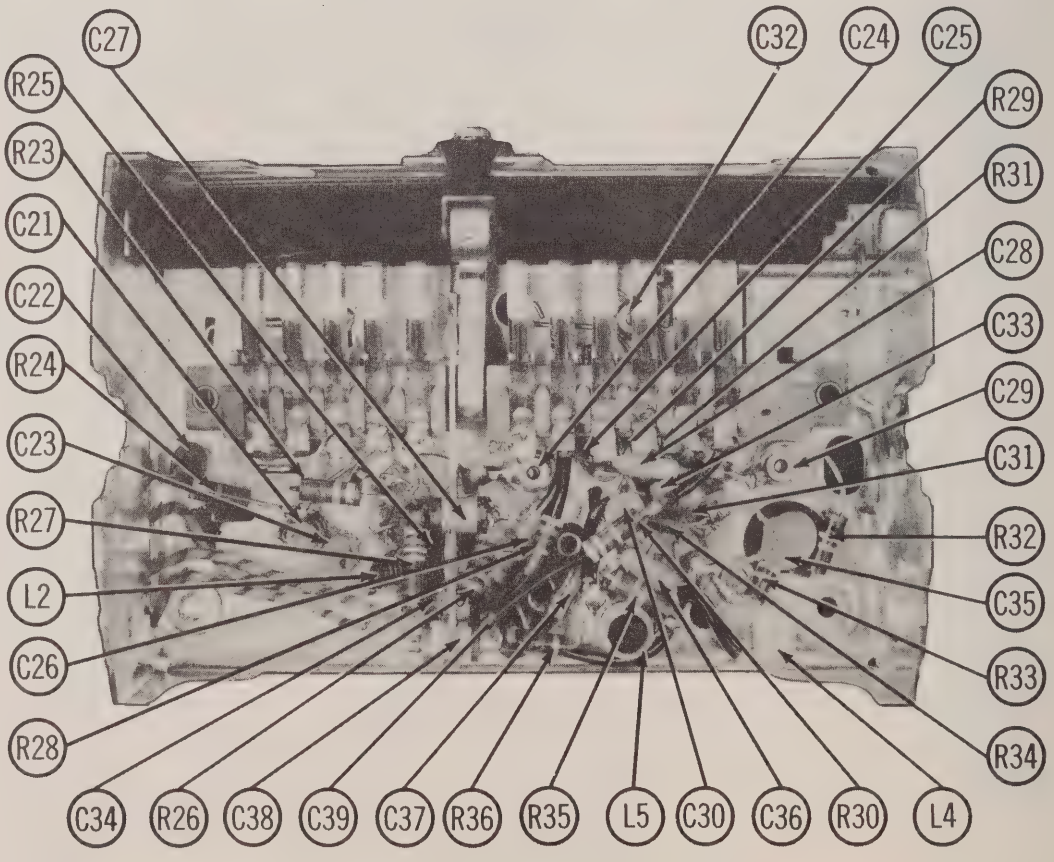
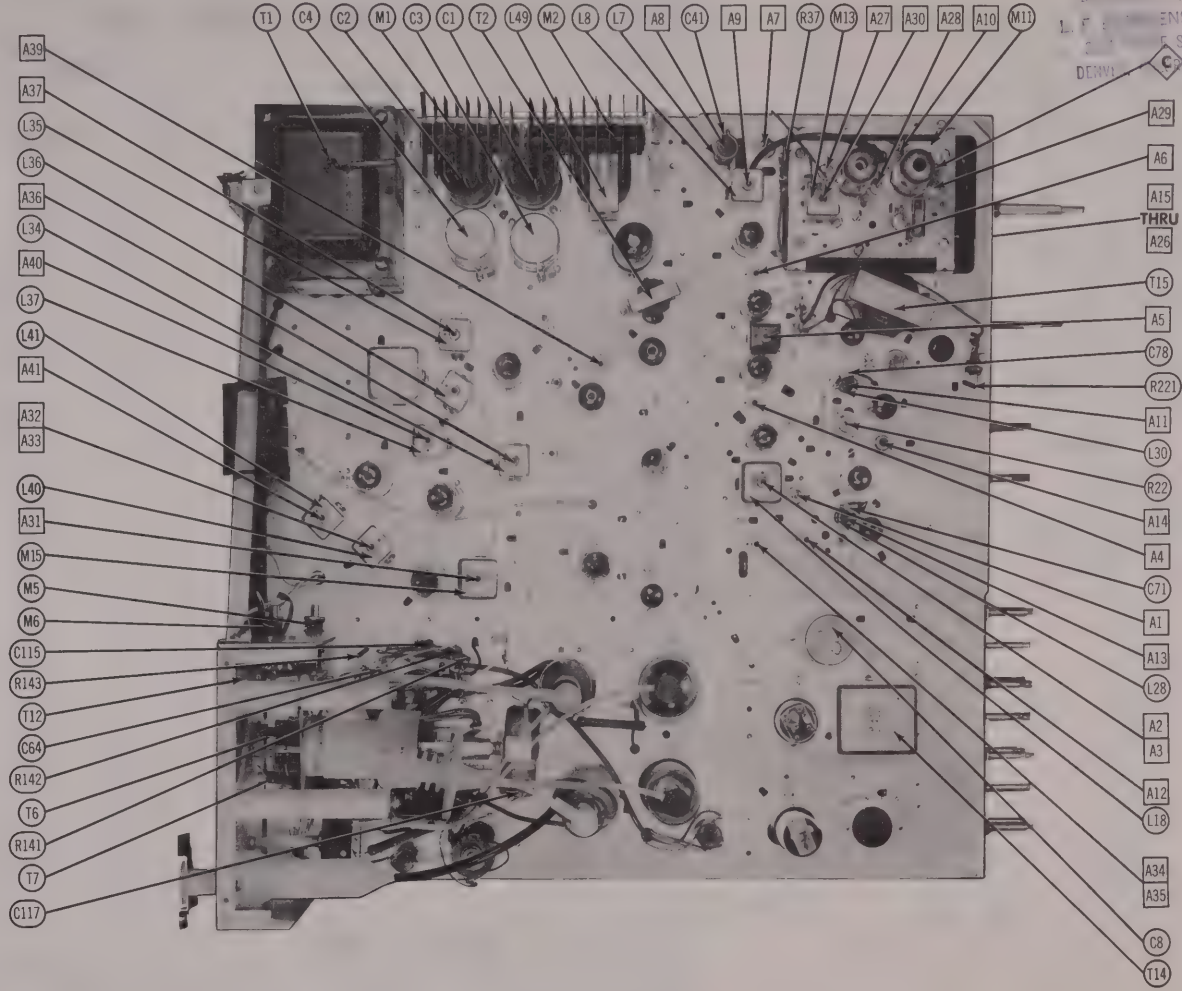
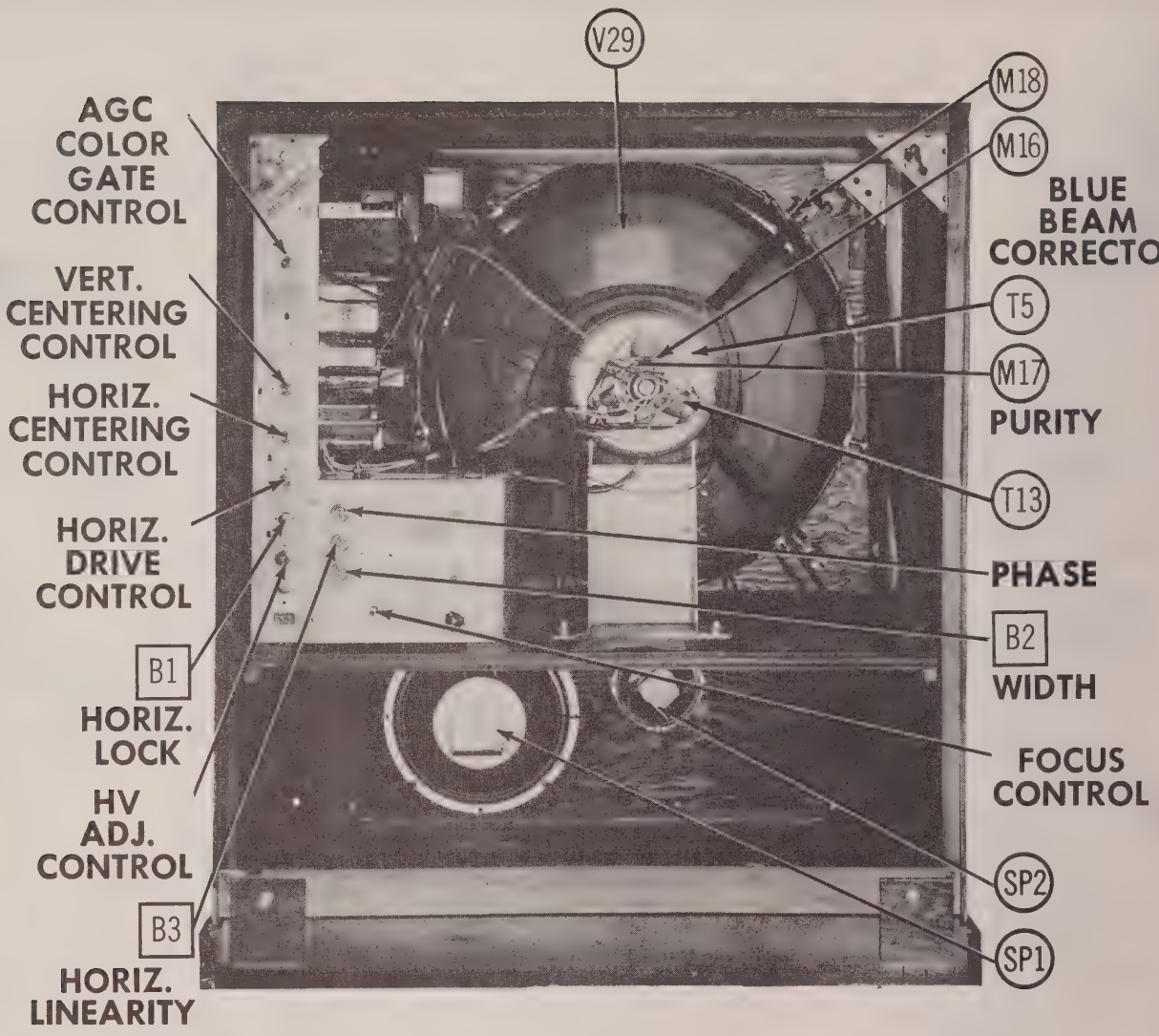
TUNER SCHEMATIC



RF TUNER-BOTTOM VIEW



CHASSIS TOP VIEW



CABINET—REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 10 push-on type control knobs from front panel of cabinet.
2. Remove 14 wood screws. Remove rear cover.
3. Remove picture tube socket, yoke plug, HV lead, speaker leads, convergence plug and ground lead.
4. Remove 4 wood screws from corner bracket at the upper left corner of cabinet.
5. Remove 3 chassis bolts. Remove chassis.

CABINET SHELL REMOVAL

1. Remove 14 wood screws. Remove rear cover.
2. Remove 2 screws located at the lower front sides of the cabinet (one on each side of cabinet).
3. Remove the top screw of each cabinet shell retaining bracket located at the lower rear of cabinet.
4. Remove cabinet shell by lifting straight up.

SPEAKER REMOVAL

1. Remove speaker leads at audio output transformer.
2. Remove 4 hex nuts from large speaker and 2 hex nuts from small speaker.
3. Remove speakers from cabinet.

PICTURE TUBE REMOVAL

1. Remove cabinet shell as outlined under "Cabinet Shell Removal" and chassis as outlined under "Chassis Removal".
2. Remove the blue horizontal corrector magnet, purity magnet, convergence yoke assembly and complete yoke assembly including brackets.
3. Remove the safety glass panel assembly. Panel is held by 4 nuts located inside cabinet front.
4. Place cabinet face down on a soft surface.
5. Remove the picture tube harness assembly and insulating shield.
6. Before removing the picture tube, make note of the position of the edge magnets, HV connector, banding around tube and the depth in which picture tube is seated in cabinet. The picture tube, banding and edge magnet assembly are removed from the cabinet as a unit.
7. Remove picture tube assembly from cabinet.
8. Remove edge magnet assembly and the insulating band around picture tube.

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AIRLINE MODEL GSL-4002B

TRADE NAME	Airline	MODELS GSL-4002A, GSL-4002B, GSL-4002C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois	
TYPE SET	Television Receiver	
TUBES	Nineteen	
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING 1.39 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.4MC, Sound IF 21.9MC (Intercarrier)	

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Servicing in the Field 1
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Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

MODELS GSL-6010A, GSL-6011A, GSL-6012A and GSL-6013A ARE COMBINATION RECEIVERS. RECORD CHANGER MODEL, WEBSTER-CHICAGO MODEL 114.

AIRLINE MODELS GSL-4002A, B, C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A

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CHASSIS

GSL-4002A, GSL-4002B, GSL-4002C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.

2. Remove 5 wood screws and 1 metal screw. Remove rear cover.

3. Disconnect speaker plug.

4. Remove 7 chassis bolts. Remove chassis.

5. Remove 2 speaker nuts. Remove speaker.

NOTE: If it is necessary to remove the chassis for servicing it is also necessary to remove the speaker. The speaker is the electro-magnetic type and must be connected for proper operation.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 wood screws holding wood strip at the top edge of the safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator may be made from the rear panel of the chassis. Adjust the horizontal hold until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L17) located on top of the chassis.

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of picture tube located flush against the yoke. Turn the knurled (disk-like) knob and at the same time rotate the ring around the tube until picture is properly centered.

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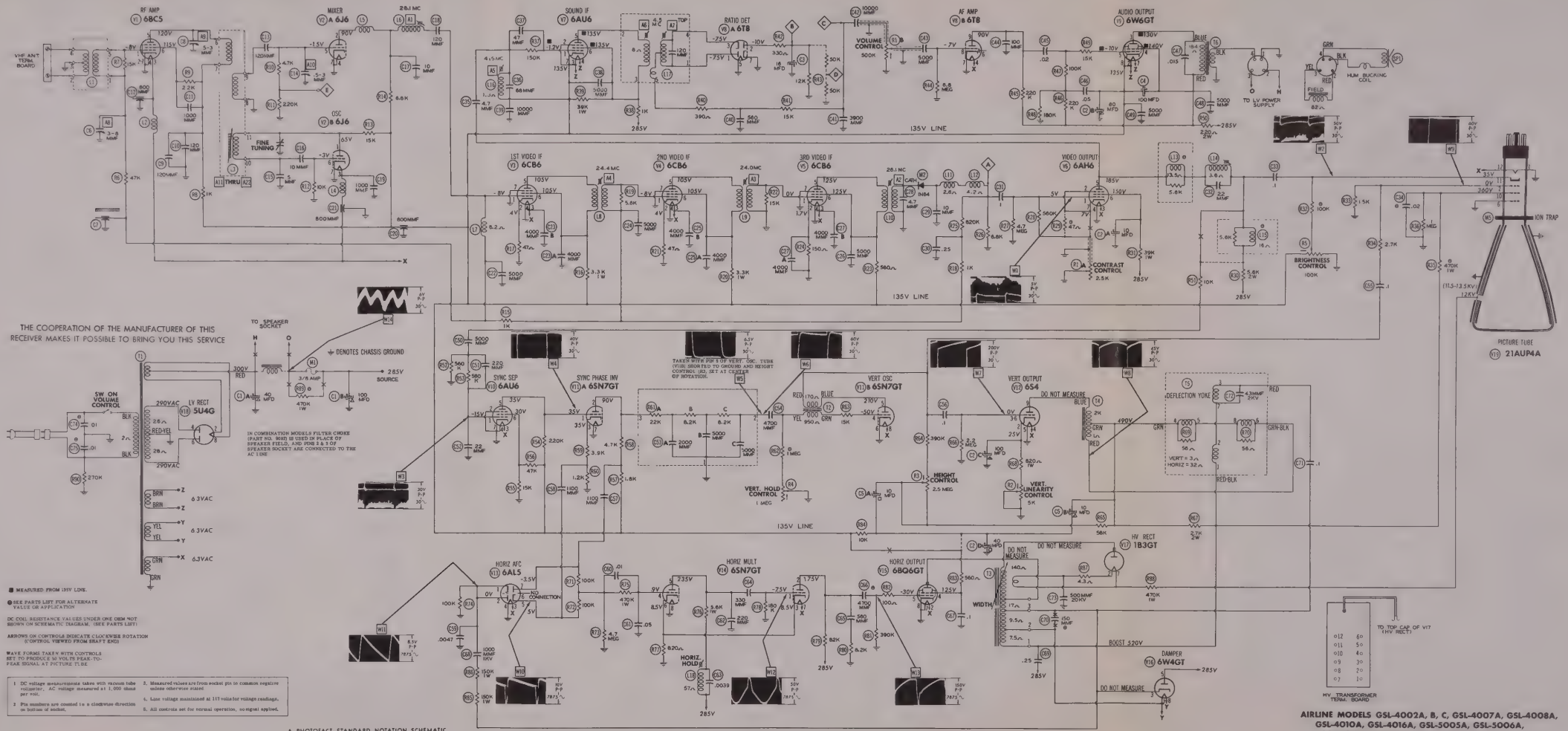
RF AMP V1 6BC5
MIXER V2 A 6J6
OSC V7 B 6J6
28.1 MC
VHF ANT TERM. BOARD
FINE TUNING
A11 THRU A12
SOUND IF V7 6AU6
RATIO DET V8 A 6T8
AF AMP V8 B 6T8
AUDIO OUTPUT V9 6W6GT
VOLUME CONTROL 500K
TO LV POWER SUPPLY
HUM BUCKING COIL
FIELD
1ST VIDEO IF V1 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V5 6CB6
24.4 MC
24.0 MC
26.1 MC
VIDEO OUTPUT V6 6AH6
CONTRAST CONTROL 2.5K
BRIGHTNESS CONTROL 100K
ION TRAP
PICTURE TUBE V13 21AUP4
135V LINE
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
TO SPEAKER SOCKET
DENOTES CHASSIS GROUND
285V SOURCE
IN COMBINATION MODELS FILTER CHOKE (PART NO. 9080) IS USED IN PLACE OF SPEAKER FIELD, AND PINS 2 & 5 OF SPEAKER SOCKET ARE CONNECTED TO THE AC LINE
SW. ON VOLUME CONTROL
LV RECT. V18 5U4G
290VAC
RED-YEL
6.3VAC
SYNC SEP 6AU6
SYNC PHASE INV V11 A 6SN7GT
VERT OSC V11 B 6SN7GT
VERT OUTPUT V12 6S4
DO NOT MEASURE
DEFLECTION YOKE
VERT = 3A
HORIZ = 32A
HEIGHT CONTROL 2.5 MEG
VERT. LINEARITY CONTROL 5K
VERT. HOLD CONTROL 1 MEG
TAKEN WITH PIN 5 OF VERT. OSC. TUBE (V11B) SHORTED TO GROUND AND HEIGHT CONTROL (R3) SET AT CENTER OF ROTATION.
HV RECT V17 1B3GT
HORIZ AFC V13 6AL5
HORIZ MULT V14 6SN7GT
HORIZ OUTPUT V15 6BQ6GT
HORIZ HOLD
WIDTH
BOOST 520V
DAMPER V16 6W4GT
HV TRANSFORMER TERM. BOARD
TO TOP CAP OF V17 (HV RECT)
MEASURED FROM 135V LINE.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 90 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1 DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2 Pin numbers are counted in a clockwise direction on bottom of socket.
3 Measured values are from socket pin to common negative unless otherwise stated
4 Line voltage maintained at 117 volts for voltage readings.
5 All controls set for normal operation, no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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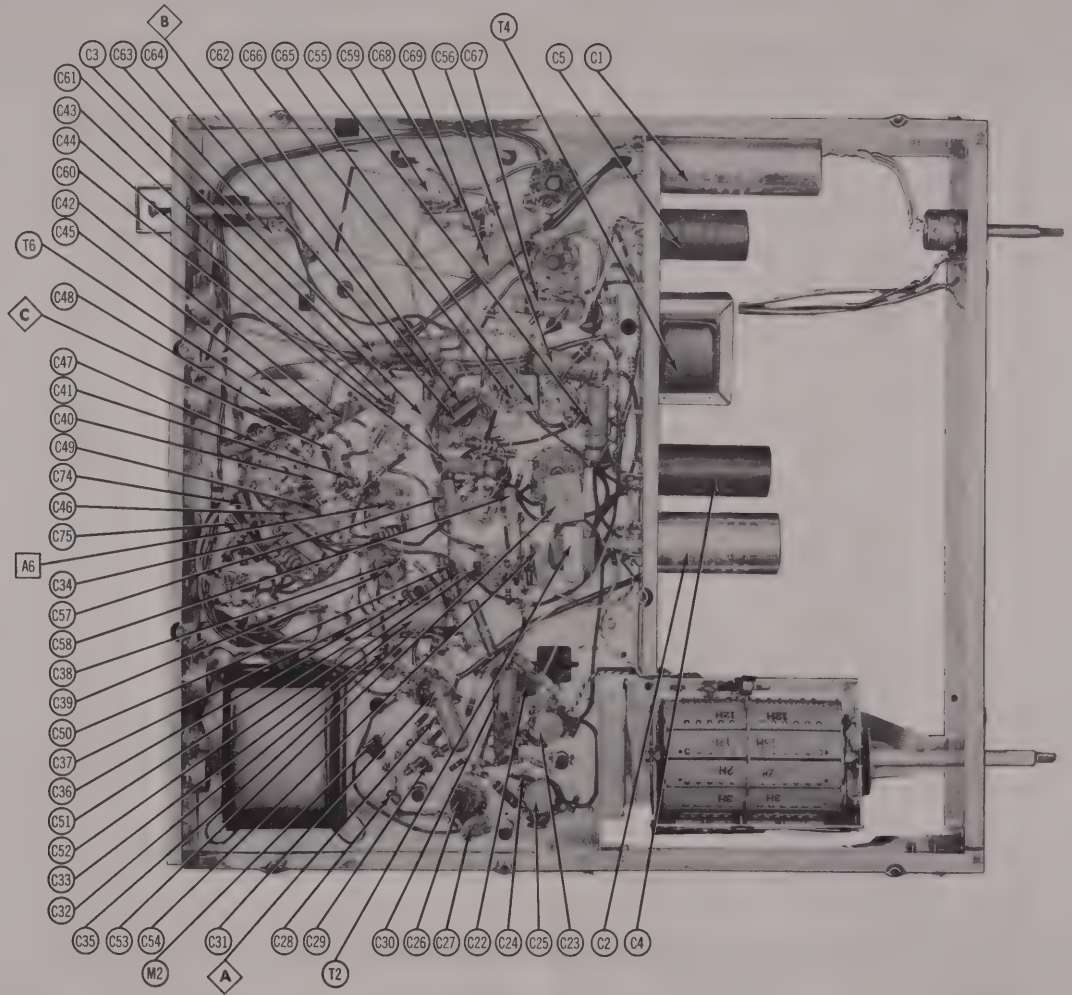
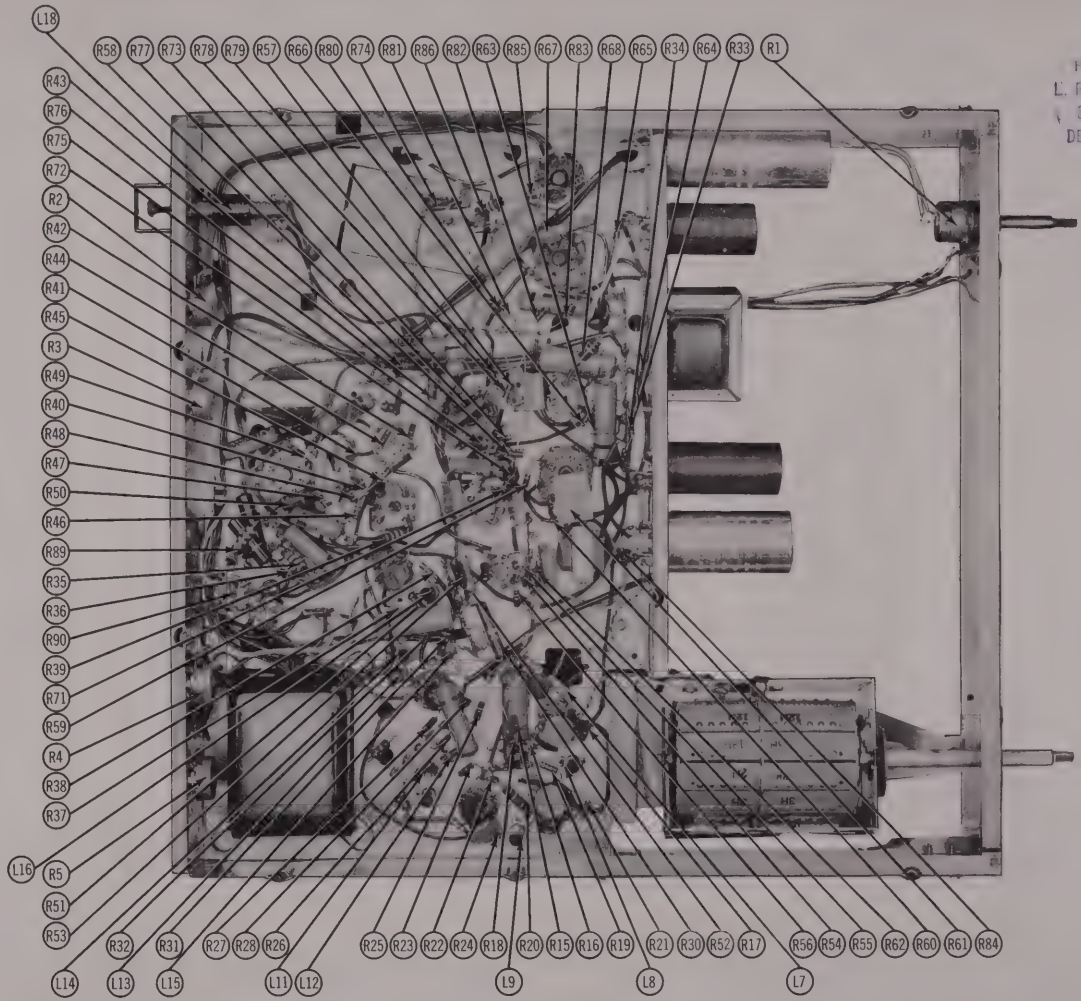
AIRLINE MODELS GSL-4002A, B, C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

AIRLINE MODELS GSL-4007A, B, C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4010A, GSL-5003A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

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L. F. [illegible]
[illegible]
DENVER, [illegible]

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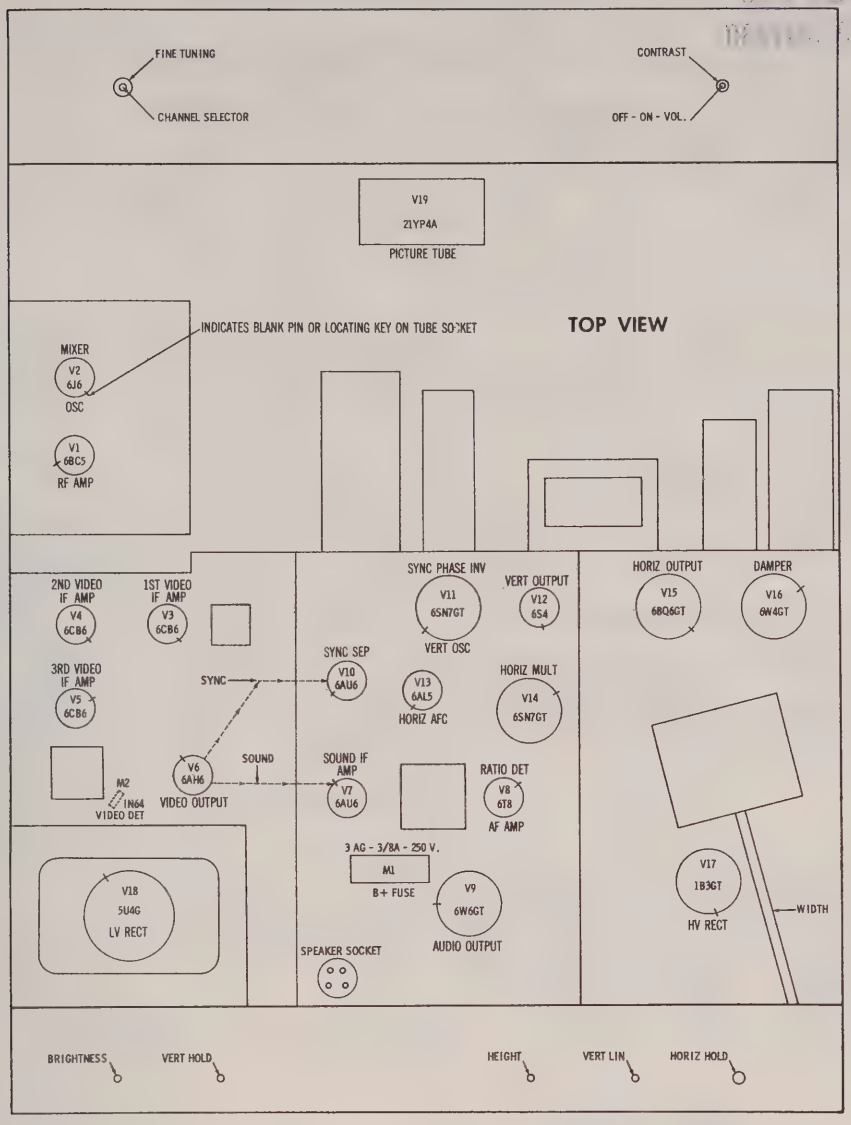
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V18, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V9**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V19**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V11**
No horiz. sync - **V11, V13, V14**
No vert. or horiz. sync - **V10, V11**

SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V19**
No vertical deflection - **V11, V12**
Poor vert. linearity or foldover - **V11, V12**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, V18**
Vert. off freq. - **V11**
Horiz. off freq. - **V11, V13, V14**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped away from the chassis.
Do not remove the horizontal multivibrator tube (V14) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace it with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 4.5 volt battery to the ungrounded side of C40. Connect the positive lead to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	Not used	26.1MC	Any Unused Channel	USE VTVM. DC probe to point (A). Common to chassis.	A1, A2	Adjust for maximum deflection. Attenuate signal generator to maintain less than 2 volts reading.
2.	"	"	"	24.0MC	"	"	A3	"
3.	"	"	"	24.4MC	"	"	A4	"
4.	"	"	25MC (10MC Swp)	26.1MC	"	Vert. Amp. of scope to point (A). Low side to chassis.	A1, A2	Adjust for response curve similar to Fig. 1. If necessary, retouch A1 thru A4.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 50K ohm (±1%) in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.
Short antenna terminals to ground.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A5, A6	Adjust for maximum deflection.
6.	"	"	"	"	DC probe to point (C). Common to point (D).	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Short antenna terminals to chassis.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A5, A6	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
6.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A7	Reconnect C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A6 for maximum amplitude and straightness of crossover lines.

RF AND MIXER ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 back in its socket.
Connect the negative lead of a 1.5 volt battery to the ungrounded side of C24. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A8, A9, A10	Adjust for maximum response as in Fig. 4. If markers fall below 70% on any channel, retouch A8, A9 and A10 and recheck all channels.
8.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 4. If markers fall below 70% on any channel, make compromise adjustment of A8, A9 and A10 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			185MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

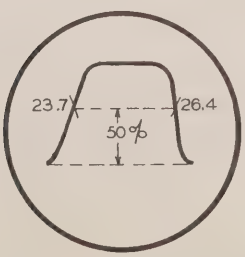


FIG. 1

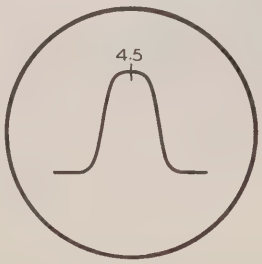


FIG. 2

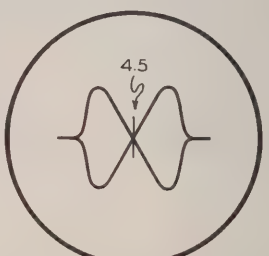


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

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OSCILLATOR ALIGNMENT

Leave bias connected as under "RF And Mixer Alignment".
The channel adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A12	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A13	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A14	
			185MC (10MC Swp)	187.25MC 191.75MC	9		A15	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A16	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A17	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A18	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A19	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A20	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A21	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A22	

4.5MC TRAP ALIGNMENT

Tune in a TV station and adjust the fine tuning until sound bars just appear in the picture.
Starting from the extreme counter clockwise position adjust A23 in a clockwise direction for MINIMUM sound indication in the picture.

RADIO ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
10.	.05MFD	High side to rear stator lug on tuning gang. Low side to B-.	455KC (400∿ 30% Mod.)	Radio	Any point near center where no signal is received.	Across Voice Coil	A23, A24, A25, A26	Adjust for maximum deflection.
11.	"	"	1620KC (400∿ 30% Mod.)	"	Tuning gang fully open	"	A27	"
12.	None	Lay generator lead near loop	1400KC (400∿ 30% Mod.)	"	Tune for 1400KC signal	"	A28	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

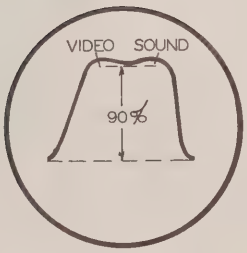


FIG.4

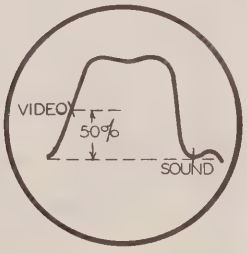


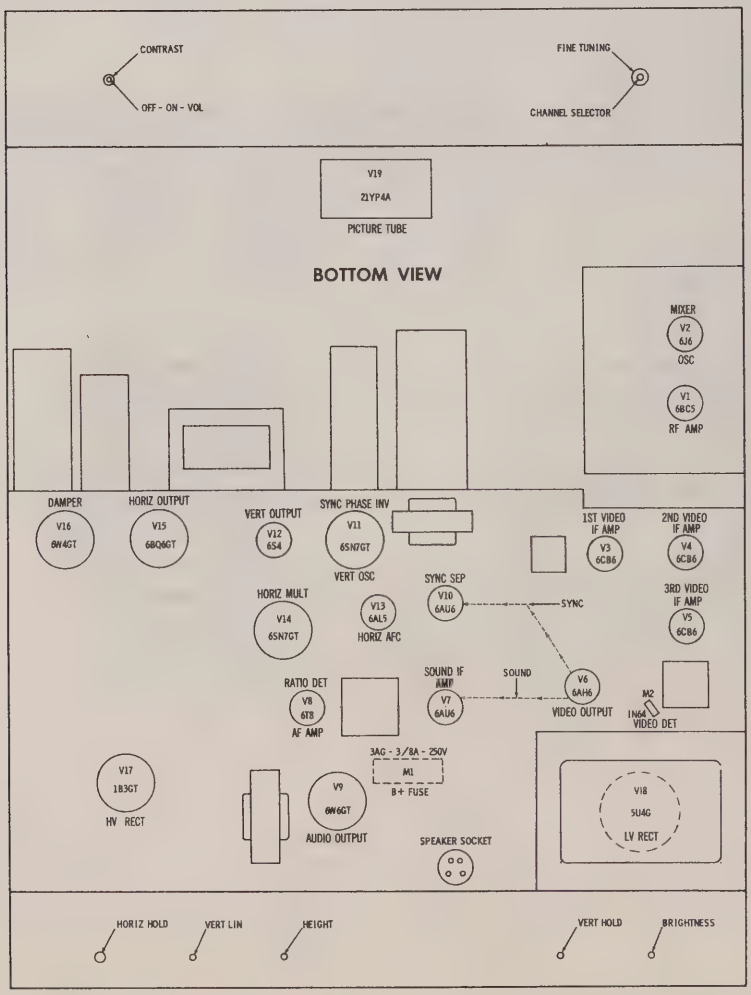
FIG.5

AIRLINE MODELS GSL-4002A, B, C, GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A

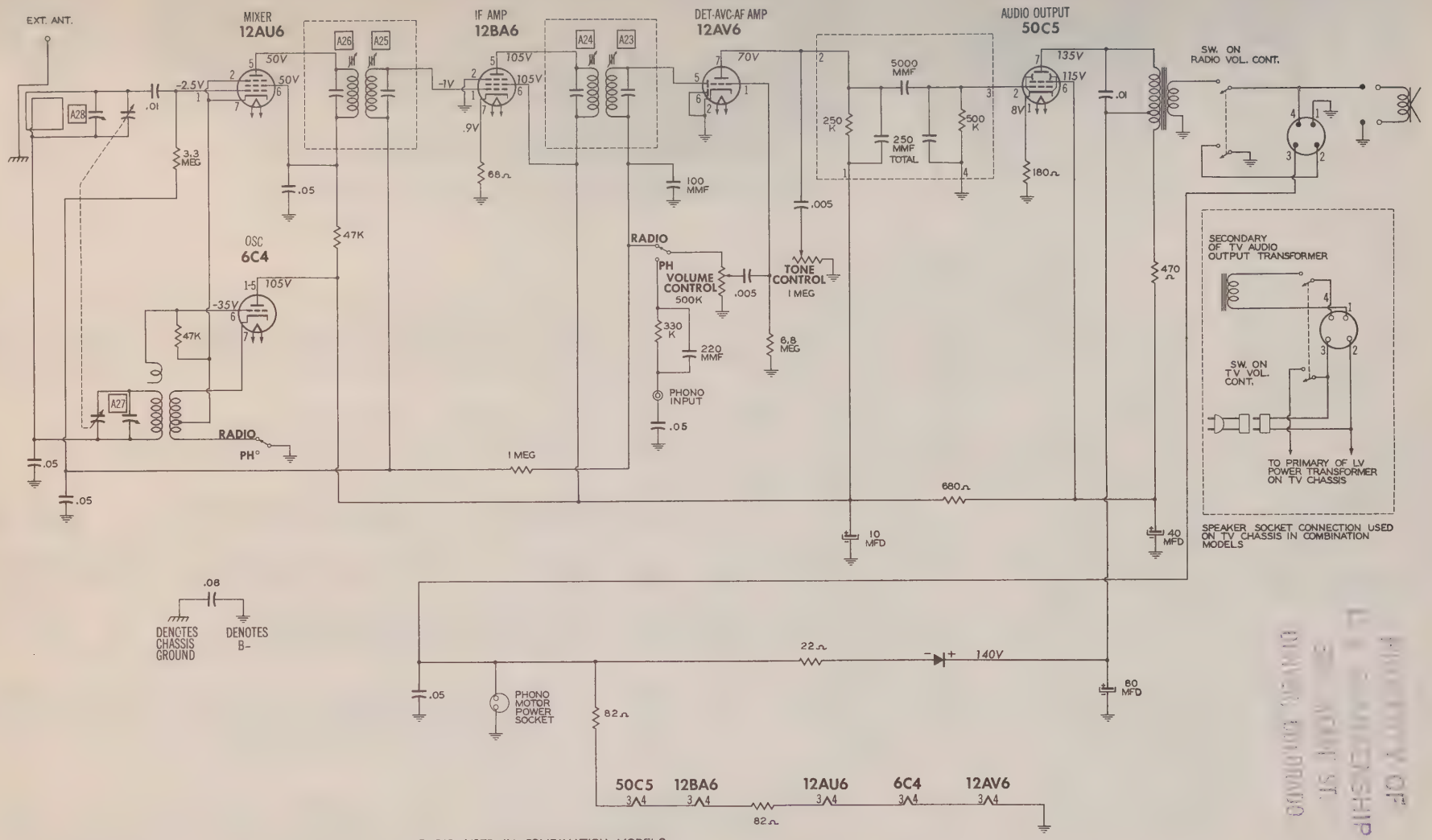
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	850KΩ	0Ω	.1Ω	0Ω	■ 1KΩ	■ 3.2KΩ	0Ω		
V 2	6J6	■ 15KΩ	■ 6.8KΩ	.1Ω	0Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	820KΩ	47Ω	.1Ω	0Ω	■ 3.3KΩ	■ 3.3KΩ	0Ω		
V 4	6CB6	820KΩ	47Ω	.1Ω	0Ω	■ 3.3KΩ	■ 3.3KΩ	0Ω		
V 5	6CB6	.3Ω	150Ω	.1Ω	0Ω	■ 560Ω	■ 560Ω	0Ω		
V 6	6AH6	500KΩ	30Ω	.1Ω	0Ω	† 5.6KΩ	† 39KΩ	30Ω		
V 7	6AU6	170KΩ	20KΩ	20KΩ	20KΩ	† 1KΩ	† 1KΩ	20KΩ		
V 8	6T8	INF	12KΩ	INF	.1Ω	0Ω	NC	0Ω	6.8Meg	† 220KΩ
V 9	6W6GT	NC	20KΩ	† 500Ω	† 300Ω	200KΩ	TP	20KΩ	20KΩ	
V 10	6AU6	1Meg	0Ω	.1Ω	0Ω	■ 220KΩ	■ 25KΩ	0Ω		
V 11	6SN7GT	■ 220KΩ	■ 6.5KΩ	5KΩ	1.3Meg	▲ 850KΩ	0Ω	0Ω	.1Ω	
V 12	6S4	NC	2.5KΩ	2.2Meg	.1Ω	0Ω	2.2Meg	NC	NC	▲ 4.7KΩ
V 13	6AL5	100KΩ	100KΩ	.1Ω	0Ω	4.8Meg	NC	4.8Meg		
V 14	6SN7GT	180KΩ	† 82KΩ	820Ω	5Meg	† 5.6KΩ	820Ω	.1Ω	0Ω	
V 15	6BQ6GT	NC	.1Ω	NC	■ 560Ω	390KΩ	NC	0Ω	0Ω	TOP CAP ▲ 17Ω
V 16	6W4GT	NC	NC	350KΩ	NC	† 88Ω	NC	350KΩ	350KΩ	
V 17	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 157Ω
V 18	5U4G	INF	50KΩ	INF	26Ω	INF	28Ω	INF	50KΩ	
V 19	21YP4A	0Ω	1.5KΩ	PIN 6 0Ω	PIN 10 ▲ 400KΩ	PIN 11 ■ 120KΩ	PIN 12 .1Ω			

■ MEASURED FROM 135V LINE.
† MEASURED FROM PIN 8 OF V18.
▲ MEASURED FROM PIN 3 OF V16.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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RADIO SCHEMATIC

AIRLINE MODELS GSL-4002A, B, C, GSL-4007A, GSL-4008A,
GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A,
GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BC5	
V2	Mixer-Oscillator	6J6	
V3	1st. Video IF Amplifier	6CB6	
V4	2nd. Video IF Amplifier	6CB6	
V5	3rd. Video IF Amplifier	6CB6	
V6	Video Output	6AH6	
V7	Sound IF Amplifier	6AU6	
V8	Ratio Det.-AF Amp.	6T8	
V9	Audio Output	6W6GT	

ITEM No.	USE	TYPE	NOTES
V10	Sync Separator	6AU6	
V11	Sync Phase Inv.-Vert.Osc.	6SN7GT	
V12	Vert. Output	6V6	
V13	Horiz.AFC	6AL5	
V14	Horiz. Mult.	6SN7GT	
V15	Horiz. Output	6BQ6GT	
V16	Damper	5W4GT	
V17	HV Rectifier	1B3GT	
V18	LV Rectifier	5U4G	

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	AIRLINE PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V19	21YP4A(3)(5)	21YP4A ①	21YP4A ①	21YP4A ④	① Aluminized ② Silver screen "86" ③ Used in some versions
	21AUP4A①	21YP4	21YP4	21YP4	
		21AUP4A ①	21AUP4A ①	21AUP4A/ B ②	
		21AUP4			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	400	N-8969	AFH2-64-35	C037	FP347	TM-3056	T-189	TVL-3879
B	100	400							
C1A	20	450	N-8967	AFH4-107-20	DI01	FP483.4	TM-4106	Q-383	TVL-4700
B	80	200							
C	100	50							
D	40	300							
C3	25	50	N-8913	PRH1R5	BR1R5	TC44	TD-15-150	TM-1515	TVA-1409
C4	100	200	N-8970	AFH1-31-25	A035	FP139.1	TM-100-200	C-156 MT-3530	TVA-1515
C5A	10	450	N-8939	AFH3-47	B037	FP331	TM-D10-450	D-300	TVL-3750
B	10	450							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C8	3-8		N-8995		829-10					
C7	800		N-8969							
C9	5-3		N-8995		829-3		3139-01-SR5	C7565A		
C9	120		N-9411	DI-00012	DD-121	G044	811-121	UC-5213	5GA-T12	
C10	120		N-9411	DI-00012	DD-121	G044	811-121	UC-5213	5GA-T12	
C11	1000		N-9414	BPD-001	DD-102	K069	901-001	DC-521	5HK-D1	
C13	800		N-9409							
C13	130		N-9411	DI-00013	DD-121	G044	811-121	UC-5213	5GA-T12	
C14	.5-3		N-8997		829-3		3139-01-SR5	C7565A		
C15	5		N-9412							
C16	5		N-9413	NPO-DI10	TCZ-10	Z018	NPOA-100	Z7-541	5TCC-Q1	
C17	10		N-9413	NPO-DI0	TCZ-10	Z018	NPOA-100	Z7-541	5TCC-Q1	
C18	120		N-9411	DI-00013	DD-121	G044	811-121	UC-5213	5GA-T12	
C19	1000		N-9414	BPD-001	DD-102	K069	901-001	DC-521	5HK-D1	
C20	800		N-9409							
C21	800		N-9409							
C22	5000		BPD-005	DD-502	K080	811-005	DC-525	5HK-D5		
C23A	4000		BPD-2X004	D6-402	DK078	822-004	DCD524	5HK-2D4		
H	4000			D6-402						
C24	5000		BPD-004	DD-502	K080	811-005	DC-525	5HK-D5		
C25A	4000		N-7774	BPD-2X004	D6-402	DK078	822-004	DCD524	5HK-2D4	
H	4000			D6-402						
C26	5000		BPD-005	DD-502	K080	811-005	DC-525	5HK-D5		
C27A	4000		N-7774	BPD-2X004	D6-402	DK078	822-004	DCD-524	5HK-2D4	
H	4000			D6-402						
C28	6.7			NPO-6R7	TCZ-6R7	TZ07	NPOA-6R7	Z7-5547	5TCCB-V47	
C29	10			NPO-6D10	TCZ-10	TZ09	NPOA-100	Z7-541	5TCC-Q1	
C30	.35	300		P288N-35		CUB2P35		P7402	5TM-P35	
C31	.1	600		P288N-1	DP-104	CUB4P1		P7401	5TM-P1	
C33	22		N-9949	NPO-S1Z2	TCZ-33	TZ14	MPOK-230		5TCC-Q22	
C34	1	400		P488N-1	DF-104	CUF4P1		P7401	4TM-P1	
C34	.02	600		BPD-02	DF-203	CUB4S2	S17-02	P7S13	6TM-S2	Note 1
C35	6.7			NPO-S2R7	TCZ-4R7	TZ07	NPOA-4R7	Z7-5547	5TCCB-V47	
C36	68			NPO-S268	TCZ-68	TZ36	NPO-337-680		5TCC-Q68	
C37	47			NPO-S247	TCZ-47	TZ33	NPO-338-470	Z7-5447	5TCC-Q47	
C38	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C39	10000		N-9063	BPD-01	DD-103	K083	811-01	DC-531	5HK-S1	
C40	560	500	N-7780	1464-00056	D6-561	1R5T56	811-561		MH-556	
C41	3300		N-9059	614000	D6-332	CUB5D33	GP5-333-402	UC-5340	5GA-D33	
C43	10000		N-9063	BPD-01	DD-103	K083	811-01	DC-531	5HK-S1	
C43	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C44	100				D6-101	G1J01	G1JK-101	DC-531	5GA-T1	
C45	.02	400		BPD-02	DF-203	CUB4S2	S17-02	P7413	4TM-S2	
C46	.01	200		BPD-01	DF-503	CUB2S5		P7415	2TM-S5	
C47	.015	600	N-9045	BPD-015	DD16-153	CUB6S15	S31-015	P7S15	6TM-S15	
C48	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C48	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C50	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C51	320			NPO-S2320	D6-321	T239	811-321		MH-323	
C53	22		N-9049	NPO-S1Z2	D6-220	TZ14	S31-220		5TCC-Q22	
C54	1000					1R5D47		DC-522	MH-347	
B	5000		†M-9043	†PA-110	†PC-100	†1S5T5M1	†1405-01	DC-525	†7M-1	
C	5000							DC-525		
C54	4700	500	N-8998	1464-0047		1R5D47			MH-347	
C55	.1	400		P488N-1	DF-104	DF-104		P7401	4TM-P1	
C56	.1	400		P488N-1	DF-104	DF-104		P7401	4TM-P1	
C57	1200	500		1464-0011		1R5D61			MH-311	
C58	1100	500		1464-0011		1R5D61			MH-311	
C59	.0047	500	N-9061	BPD-0047	D6-472	CUB5D47	GP3-333-472	P7S347	5TM-D47	
C60	.01	400		BPD-01	D6-103	CUB4S1	GP3-333-103	P7411	4TM-S1	
C61	.05	200		BPD-05	DF-503	CUB2S5		P7416	2TM-S5	
C62	320	500	N-9054	NPO-S2320	TCZ-320	22R5T32	S21-321		MH-332	
C63	.0039	500	N-9060	1464-0039		1R5D39			MH-339	
C64	330	500	N-9058	1464-00033	D6-331	1R5T39	811-331		MH-333	
C65	560	500	N-9057	1464-00056	D6-561	1R5T56	811-561		MH-356	
C66	4700	500	N-7783	1464-0047		1R5D47			MH-347	Note 2
C67	.1	200		P288N-1	DP-104	CUB2P1		P7401	2TM-P1	
C68	1000	1000	N-9068	BVD-1E-1000	DD-102	VD1	1R5EV-102	MCE5100	1GA-D1	
C69	.25	400		P488N-25		CUB4P25		P7402S	4TM-P25	

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C70	150			N750-S1150	TCN-150	TN26	N750-357-1S1		5TCU-T15	Note 4
C71	.1	300		P288N-1	DP-104	CUB2P1		PT401	3TM-P1	
C72	43	3000	N-9083							
C73	500	30000	N-8041		UV-503	TV3-501	MMU30T	419	30KD-T5	
C74	.01	600			BPD-01	D6-103	CUB6S1	GP5-333-103	PT611	6TM-S1 Note 3
C75	.01	900			BPD-01	D6-103	CUB6S1	GP5-333-103	PT611	6TM-S1 Note 3

† Items C53A, C53B, C53C, R61A, R61B and R61C are combined in one unit.
Note 1. Some versions may use a .005MFD unit in this application.
Note 2. Some versions may use a 11000MMF unit (part #N-7783) in this application.
Note 3. Some versions may use a dual ceramic (part #M-9048) in place of individual items C74 and C75.
Note 4. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2500Ω	1	N-8942	P1-15	RTV-437	* Q3-492	UF252R	Contrast (Panel)
B	500KΩ	1		R2-45			UR55A	Volume (Rear)
C	Switch			KS-1			US-26	Attach to R1B.
R2A	5000Ω	½	N-8945	RX-19	A47-5000-S	Q11-U4	SU-14	Vertical Linearity
B	Shaft		Not Req.	Not Req.	FXS-1	Not Req.	Not Req.	Attach to R2A.
R3A	2.5Meg	½	N-8971	RX-85	A49-2.5Meg-S	Q11-139	SU-565	Height
B	Shaft		Not Req.	Not Req.	FXS-1	Not Req.	Not Req.	Attach to R3A.
R4A	1Meg	½	N-8943	RX-69	A47-1Meg-S	Q11-127	SU-54	Vertical Hold
B	Shaft		Not Req.	Not Req.	FXS-1	Not Req.	Not Req.	Attach to R4A.
R5A	100KΩ	½	N-8944	RX-40	A47-100K-S	Q11-138	SU-41	Brightness
B	Shaft		Not Req.	Not Req.	FXS-1	Not Req.	Not Req.	Attach to R5A.

* Concentrikit Equivalent, K-3 Kit, Base Elements and Shafts; B1T-1H & B1-1A (Panel)
B1S-1S3 & B2-300 (Rear)
T6-1 (Switch)

† Universal Replacement (Mallory Exact Duplicate Part No. UE218B).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R6	47KΩ			BTS-47K	
R7	18KΩ			BTS-18K	
R8	100KΩ			BTS-100K	
R9	2300Ω			BTS-2300	
R10	4700Ω			BTS-4700	
R11	220KΩ			BTS-220K	
R12	10KΩ			BTS-10K	
R13	15KΩ			BTS-15K	
R14	68000 5%			BTS-6800	
R15	1000Ω			BTS-1000	
R16	3300Ω	1		BTS-3300	
R17	47Ω			BTS-47	
R18	1000Ω			BTS-1000	
R19	5600Ω				
R20	3300Ω	1		BTA-3300	
R21	47Ω			BTS-47	
R22	15KΩ			BTS-15K	
R23	560Ω			BTS-560	
R24	150Ω			BTS-150	
R25	820KΩ			BTS-820K	
R26	6800Ω			BTS-6800	
R27	4.7Meg			BTS-4.7Meg	
R28	560KΩ			BTS-560K	
R29	47Ω			BTS-47	Note 1
R30	5600Ω	3		BTS-5600	
R31	39KΩ	1		BTA-39K	
R32	100KΩ			BTS-100K	Note 3
R33	1500Ω			BTS-1500	
R34	2700Ω			BTS-2700	
R35	470KΩ	1		BTA-470K	Note 3
R36	1Meg			BTS-1Meg	
R37	150KΩ			BTS-150K	
R38	1000Ω			BTS-1000	
R39	39KΩ	1		BTA-39K	
R40	390Ω			BTS-390	
R41	15KΩ			BTS-15K	
R42	330Ω			BTS-330	
R43	12KΩ			BTS-12K	
R44	4.5Meg			BTS-4.5Meg	
R45	220KΩ			BTS-220K	
R46	230KΩ 5%		N-9041	BTS-230K	
R47	100KΩ			BTS-100K	
R48	180KΩ 5%		N-7401	BTS-180K	
R49	10KΩ			BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R50	220Ω	2		BTS-220	
R51	10KΩ			BTS-10K	
R52	560KΩ			BTS-560K	
R53	180KΩ			BTS-180K	
R54	220KΩ			BTS-220K	
R55	15KΩ			BTS-15K	
R56	47KΩ			BTS-47K	
R57	180Ω			BTS-180	
R58	4700Ω			BTS-4700	
R59	3900Ω			BTS-3900	
R60	1200Ω			BTS-1200	
R61A	22KΩ			BTS-22K	
B	8200Ω		†N-8942	BTS-8200	
C	2500Ω			BTS-2500	
R62	1Meg			BTS-1Meg	Note 4
R63	15KΩ			BTS-15K	
R64	390KΩ			BTS-390K	
R65	56KΩ			BTS-56K	
R66	2.2Meg			BTS-2.2Meg	
R67	2700Ω	2		BTS-2700	
R68	820Ω	1		BTA-820	
R69	56Ω				
R70	56Ω				
R71	100KΩ				
R72	100KΩ				
R73	4.7Meg				
R74	100KΩ				
R75	470KΩ	1			
R76	2700Ω	1			
R77	820Ω			BTS-820	
R78	180KΩ				
R79	22KΩ				
R80	120KΩ				
R81	180KΩ				
R82	100Ω				
R83	560Ω				
R84	10KΩ				
R85	150KΩ	1			
R86	150KΩ	1			
R87	4.5Ω 5%		N-8125	BW1-4.5 5%	
R88	470KΩ	1			
R89	470KΩ	1		BTA-470K	Note 5
R90	270KΩ			BTS-270K	

Note 1. Not used in Model GSL-4003B.
Note 2. Some versions use a 220KΩ ½W resistor in this application; also some versions of Model GSL-4003B use a 200KΩ ½W 5% resistor in this application.
Note 3. Some versions use a 220KΩ ½W resistor in this application.
Note 4. Some versions use a 1.2Meg ½W resistor in this application.
Note 5. Not used in some versions.
† Items R61A, R61B, R61C, C53A, C53B and C53C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING					REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3		AIRLINE PART No.	Halloran PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ 1.59A	550VCT @ .190A	5V @ 3A SRC-4 SRC-5 6.3V 6.3V @ 1.35A @ 7A	6.3V @ 1.2A		N-8935					

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							
		AIRLINE PART No	Halloran PART No	Merit PART No	RCA TYPE No	Bom PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert. Osc. Trans.	N-9002	B4702 ①	A-3303 ①	209T1 ②	V40S ③	A-8125 ①	28A03 ④	A-97X ①
T3	Horiz. Output Trans.	N-8938	FB412 *	HVO-49 *	232T1 & 212R1 *	X11 *	A-8364 *	FLY-39 *	D-35 & WC-12 *
T4	Vert. Output Trans.	N-8937	Z1900 ②	A-3081 ①	V30S ①	A-8140 ①	26B55 ②	A-110X ①	
T5A	Yoke(70°)Horiz(24MH)	N-8920	DF603 ③	MDF-74 ③	314D1 ③	Y70F25/3 ③	DY-10A ③	Y-11 ③	Y-20-1 ③
B	Vert.(3MH)								

① Drill new mounting hole(s).
② Connect as auto transformer.
③ Use 60 to 1 horiz ratio.
④ Use original horizontal damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halloran Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Bom Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	Horiz. Out. Plate Lead	Horiz. Output Plate Lead	10	8	Horiz. Output Plate Lead	Horiz. Output Plate Lead	10
3	4	4	6 or 7	4	4	4	6 or 7
2	3	3	5	2	3	3	5
1	1	1	1	1	"G"	1	1
Locust Width Coil Arms			212R1 Across 5 & 1				WC-12 Red & Blue Terms. Across 2 & 1
Special Note			⑤		⑥ ⑦		⑤ ⑧

② Jumper terminals #2 and #3.
③ Jumper terminals #1 and "A".
⑤ If insufficient width add capacity (approx. 56MMF ② 4KV) across terminals "G" and #4.
⑥ Jumper terminals #9 and "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	AIRLINE PART No.	Halloran PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	3.2KΩ	3-4Ω	N-8938	21005	A3018 ①	A3849 ①	28S50 ①	S-1X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD V. C. IMP		AIRLINE PART No.	QUAM PART No.	RCA TYPE No.	
SP1	9"	880	3-4Ω	N-8184	9S8S		

COILS (RF-IF)

ITEM No.	USE	DC RES		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1A	Ant. Coil	0OCT	0Ω	N-9152				Channel 2
B	Ant. Coil	0OCT	0Ω	N-9153				Channel 3
C	Ant. Coil	0OCT	0Ω	N-9154				Channel 4
D	Ant. Coil	0OCT	0Ω	N-9155				Channel 5
E	Ant. Coil	0OCT	0Ω	N-9156				Channel 6
F	Ant. Coil	0OCT	0Ω	N-9157				Channel 7
G	Ant. Coil	0OCT	0Ω	N-9158				Channel 8
H	Ant. Coil	0OCT	0Ω	N-9159				Channel 9
I	Ant. Coil	0OCT	0Ω	N-9160				Channel 10
J	Ant. Coil	0OCT	0Ω	N-9161				Channel 11
K	Ant. Coil	0OCT	0Ω	N-9162				Channel 12
L	Ant. Coil	0OCT	0Ω	N-9163				Channel 13
L2	Fil. Choke	0Ω		N-9415				
L3A	RF, Mixer Grid, Osc. Coils	0Ω		N-8164				Channel 2
B	RF, Mixer Grid, Osc. Coils	0Ω		N-9165				Channel 3
C	RF, Mixer Grid, Osc. Coils	0Ω		N-9166				Channel 4
D	RF, Mixer Grid, Osc. Coils	0Ω		N-9167				Channel 5
E	RF, Mixer Grid, Osc. Coils	0Ω		N-9168				Channel 6
F	RF, Mixer Grid, Osc. Coils	0Ω		N-9169				Channel 7
G	RF, Mixer Grid, Osc. Coils	0Ω		N-9170				Channel 8
H	RF, Mixer Grid, Osc. Coils	0Ω		N-9171				Channel 9
I	RF, Mixer Grid, Osc. Coils	0Ω		N-9172				Channel 10
J	RF, Mixer Grid, Osc. Coils	0Ω		N-9173				Channel 11
K	RF, Mixer Grid, Osc. Coils	0Ω		N-9174				Channel 12
L	RF, Mixer Gr , Osc. Coils	0Ω		N-9175				Channel 13
L4	Fil. Choke	0Ω		N-9416				
L5	RF Coil	0Ω		N-9417				
L6	1st Video IF	.7Ω		N-9408				
L7	RF Coil	8.2Ω		N-7321	19-1005		4612	10 Microhenries; IRC Part No. CL-1
L8	2nd Video IF	.3Ω	.3Ω	N-8929	17-1063		6249	
L9	3rd Video IF	.3Ω	.3Ω	N-8929	17-1063		6249	
L10	4th Video IF	.3Ω	.3Ω	N-8929	17-1064		6250	

AIRLINE MODELS GSL-4002A, B, C; GSL-4007A, GSL-4008A, GSL-4010A, GSL-4015A, GSL-5003A, GSL-5004A, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L11	Series Peaking Coil	2.6Ω		N-9250	19-6022		4626	24 Microhenries
L12	Series Peaking Coil	4.2Ω		N-8932				48 Microhenries
L13	Series Peaking Coil	13.5Ω		R-1140	19-3300 ■		6155 ■	294 Microhenries; Wound on 8.2KΩ resistor Note 1
L14	4.5MC Trap	3.6Ω		N-9011	20-1004	TV-151	1469	
L15	Shunt Peaking Coil	16Ω		R-1139	19-3500 ▲		6174 ▲	500 Microhenries; Wound on 6.8KΩ resistor- Note 2
L16	Sound IF	1.3Ω		N-7746	17-3400	TV-151	1469	
L17	Ratio Det.	8Ω	.9ΩCT	N-8928	17-1033 ♦	TV-110 ♦	1468 ♦	Tertiary Winding=.5Ω

Note 1. Part No. N-8933 used in Model GSL-4002A.
Note 2. Part No. N-8934 used in Model GSL-4002A.
■ Parallel with 8.2KΩ resistor.
▲ Parallel with 5.6KΩ resistor.
♦ Drill mounting holes.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L18	57Ω		N-8931	19-1576	TV-163	6210			HS-5	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA AIRLINE PART No. FUSE	AIRLINE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3/8A 250V	N-9660	N-9007	312.375 (3AG 3/8A)	357001	AGC 3/8	4405

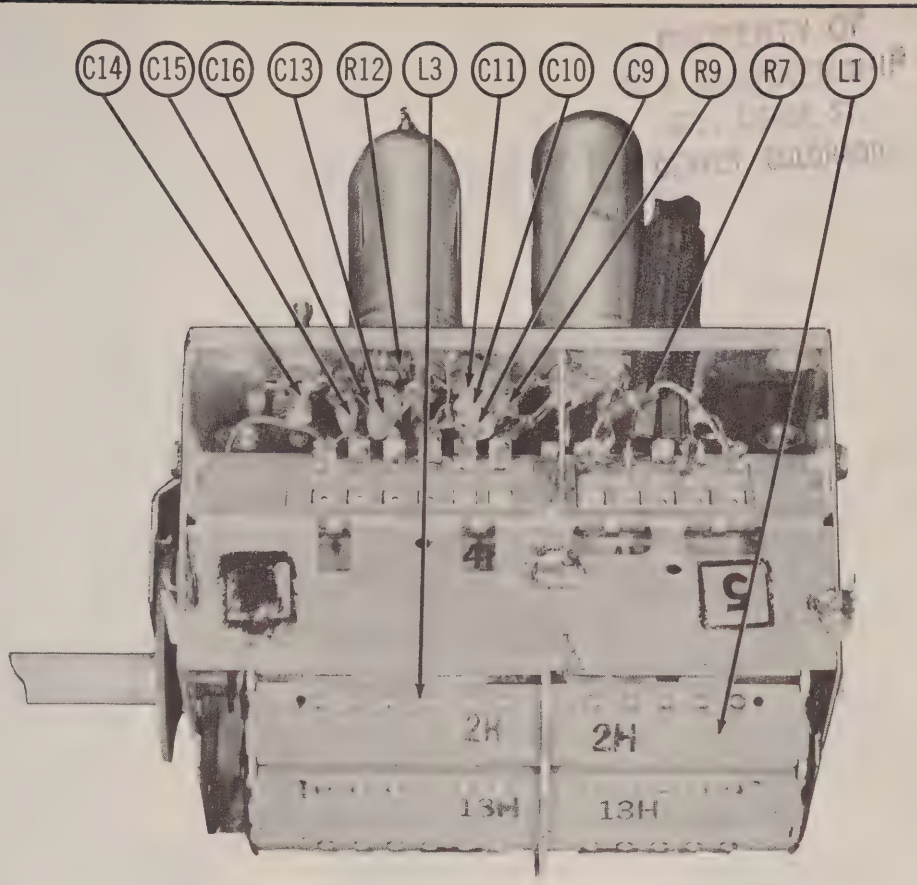
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA AIRLINE PART No.	REPLACEMENT DATA SYLVANIA PART No.	NOTES
M2	1N64		1N60	Video Det. (Pigtail)

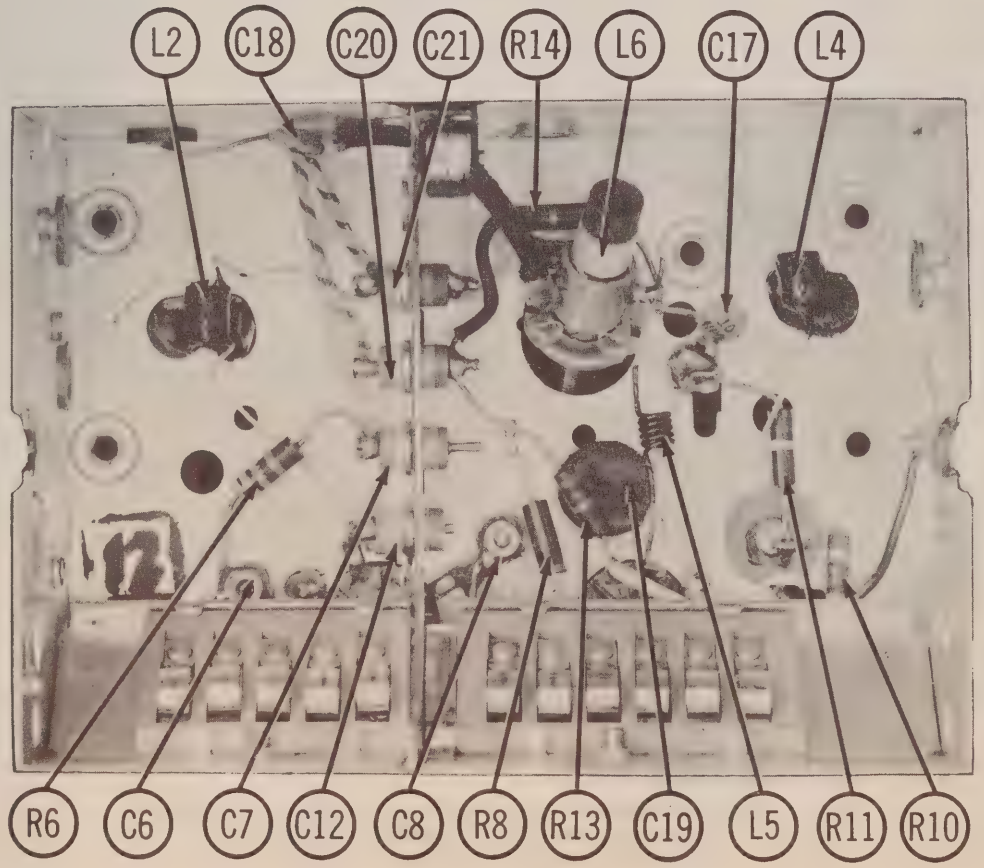
MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Tuner	N-8927	VHF
M4	Centering Device	N-8939	
M5	Ion Trap	N-9268	
	Cabinet	No. 507	Models GSL-4002A, GSL-4002B
	Knob	N-9018	Fine Tuning
	Knob	N-9260	Channel Selector
	Knob	N-9261	On-Off-Volume
	Knob	N-9020	Contrast
	Mask	R-1192	Models GSL-4002A, GSL-4002B, GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A, GSL-4002C, GSL-4016A
	Mask	N-9212	Models GSL-4007A, GSL-4008A, GSL-4010A,
	Mask	N-9100	Models GSL-5005A, GSL-5006A, Note 1
	Safety Glass	R-1194	Models GSL-4002A, GSL-4002B
	Safety Glass	N-9099	Models GSL-6010A, GSL-6011A, GSL-6012A, GSL-6013A
	Safety Glass	R-1565	Model GSL-4002C
	Safety Glass	N-9464	Models GSL-4007A, GSL-4008A, GSL-4010A, GSL-4016A, GSL-5005A, GSL-5006A

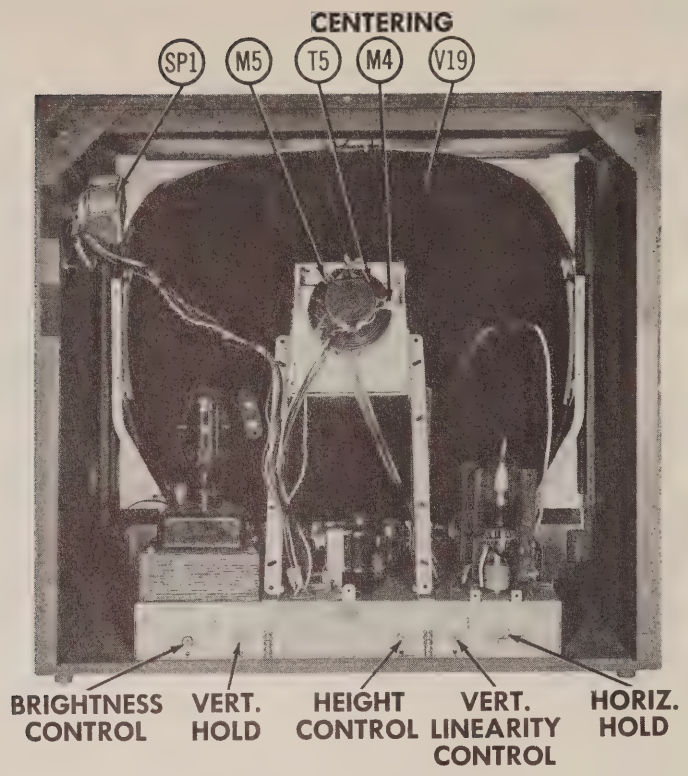
Note 1. In some versions of Model GSL-5005A a 21MP4 picture tube is used; when this tube is used mask part number becomes N- 9212.



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

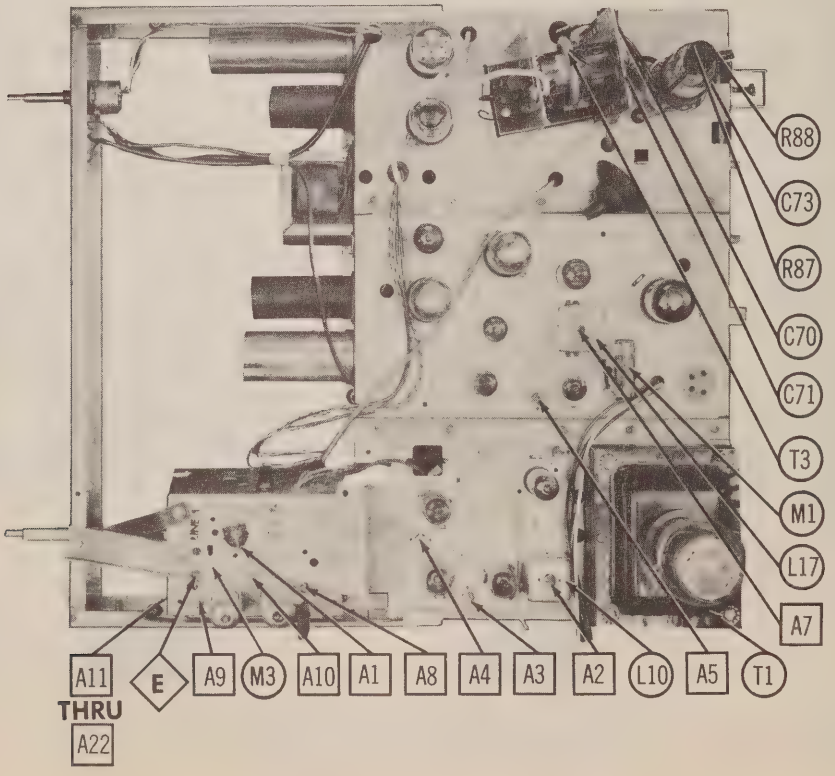
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably one with a test pattern.

Adjust the horizontal hold until the picture synchronizes horizontally, and make any further adjustments if it is necessary to set it to the middle of its range of synchronization.

Adjust the width control for picture slightly wider than necessary to fill the picture mask horizontally.

Adjustment of the width may affect the height of the picture slightly.



CHASSIS TOP VIEW

AUTOMATIC MODELS C-300, F-100, F-151,
F-152, FM-731, H-400, K-700, P-651, S-500, S-551

AUTOMATIC MODELS C-300, F-100, F-151,
F-152, FM-731, H-400, K-700, P-651, S-500, S-551

TRADE NAME	Automatic Models C-300, F-100, F-151, F-152, FM-731, H-400, K-700, P-651, S-500, S-551
MANUFACTURER	Automatic Radio Mfg. Co., Inc., 122 Brookline Ave., Boston, Mass.
TYPE SET	Battery Operated Universal Type Automobile AM Superheterodyne Receiver
TUBES (Six)	Types 6BA6 RF Amplifier, 6BE6 Converter, 6BA6 IF Amplifier, 6AV6 (or) 6AT6 Det.-AVC-AF Amp., 6V6GT Output, 6X5GT Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.6 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538KC-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	100MMF	High side to antenna lead. Low side to chassis.	1610KC	"	"	A5	"
3.	"	"	1400KC	Tune to 1400KC signal	"	A6, A7	"
4.	"	"	600KC	Tune to 600KC signal	"	A8, A9, A10	"

With receiver installed in car and antenna fully extended, tune in a weak signal near 1400KC and adjust A7 for maximum volume.

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PARTS LIST AND DESCRIPTIONS

AUTOMATIC
Model C-300

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BA6	
V2	Converter	6BE6	
V3	IF Amplifier	6BA6	

ITEM No.	USE	TYPE	NOTES
V4	Det.-AVC-AF Amp.	6AV6	Note 1
V5	Output	6V6GT	
V6	Rectifier	6X5GT	

Note 1. 6AT6 may be used in some versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	AUTOMATIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■20	350	CE-86	AFH3-107	C080	FP345.8	TMT92	T-470	TVL-3634
B	▲20	350							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AUTOMATIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.05	200	C503-2	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C3	.05	200	C503-2	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C4	.05	200	C503-2	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C5	100		CC101	N750-DI100	TCN-100	N042	N750L-101	NT-531	5TCU-T1	
C6A	220									
B	5000									
C	5000			♦PA113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2	
D	250									
E										
C7	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C8	.01	600	C103-6	BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C9	.0068	1600		DAC-23	DD16-702	CUB16D68		PT1627	MB-D68	Note 1
C10	.47	100	C504-1	VHC36		MP2P5		RF480	68P20	
C11	.5	100	C504-1	VHC36		MP2P5		RF480	68P20	

Note 1. Some versions may use .008MFD in this application (part #C802-16).
♦ Items C6A, C6B, C6C, C6D, C6E, R8A, R8B and R8C are combined in one unit. When replacing items separately, C6D and C6E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AUTOMATIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	750KΩ	½	RV-100	AB-70	A47-750K-Z		U53	Volume
B	Shaft		Not Req.	AK-3	FS-3		Not Req.	Attach to R1A
C	Bushing		Not Req.	AK-26	XB-2		EB158	Attach to R1A
D	Switch		Not Req.	KB-6	SWE-12		US26	Attach to R1A

RESISTORS

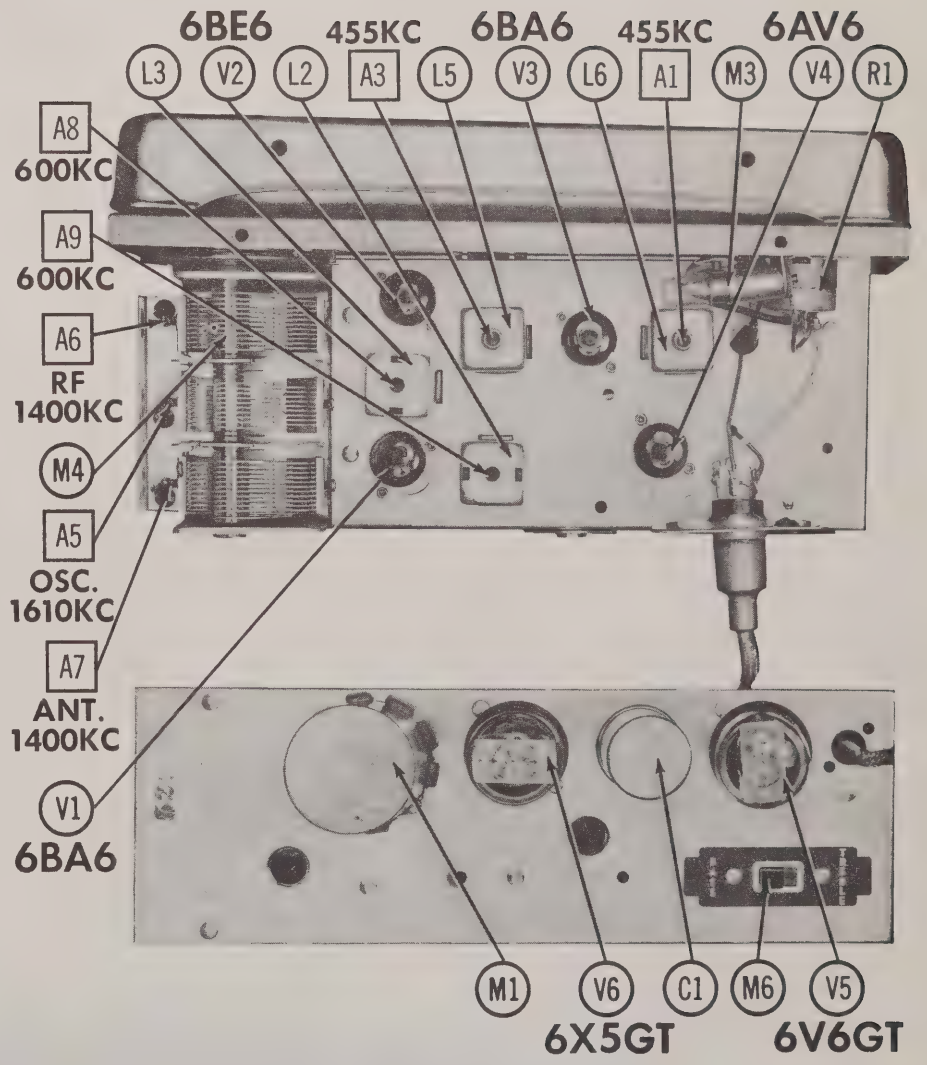
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AUTOMATIC PART No.	IRC PART No.	
R2	1.2Meg			BTS-1.2Meg	
R3	220Ω			BTS-220	Note 1
R4	22KΩ			BTS-22K	
R5	22KΩ	2		BTB-22K	
R6	2700			BTS-2700	Note 2
R7	2.2Meg			BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AUTOMATIC PART No.	IRC PART No.	
R8A	6.8Meg			BTS-6.8Meg	
B	470KΩ		♦	BTS-470K	
C	470KΩ			BTS-470K	
R9	470KΩ			BTS-470K	Note 3
R10	330Ω			BTS-330	
R11	1000Ω	1		BTA-1000	
R12	82Ω			BTS-82	
R13	82Ω			BTS-82	

♦ Items R8A, R8B, R8C, C6A, C6B, C6C, C6D, C6E are combined in one unit.
Note 1. Some versions use 330Ω in this application.
Note 2. Some versions use 1500Ω in this application.
Note 3. Not used in some versions.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AUTOMATIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6VDC CT @2.2A	480VCT @.048A			TV-100D	V3801	P2970	P6476 ①		V-16K ①

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AUTOMATIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5KΩ	3-4Ω	Part of Spkr. PM-705B	Z1002	A-3019	A-3823	26S49	S-5Z	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AUTOMATIC PART No.	QUAM PART No.	RCA TYPE No.	
SP1	5 1/4"	PM	3 - 4 Ω	PM-705B	5A21 ①		① Drill new mounting holes.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AUTOMATIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Loading Coil	1Ω						Wound on 10MMF Cap.
L2	Ant. Coil	13.5Ω	.4.6Ω	57FB-3				
L3	RF Coil	97Ω	6Ω	57FB-4				
L4	Osc. Coil	5.3Ω						Tapped @.45Ω
L5	Input IF	13.5Ω	13.5Ω	6455A6	16-6758	BC-352	12-C1	
L6	Output IF	13.5Ω	13.5Ω	6455A6	16-6758	BC-353	12-C2	
L7	Vib. Hash Choke	.1Ω						14.5 Microhenries
L8	Fil. Choke	0Ω						1.3 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AUTOMATIC PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6VDC	115∿	V-83	5301	859	5301	

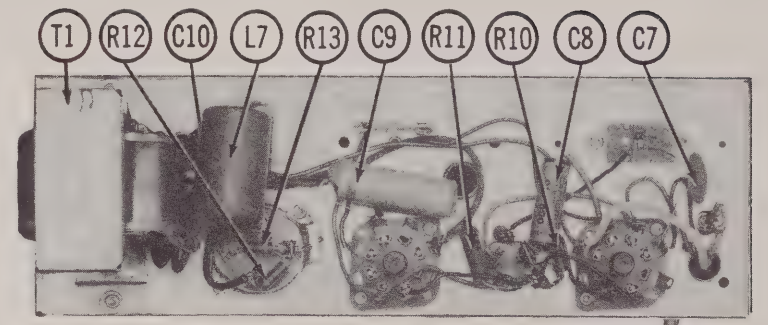
FUSES

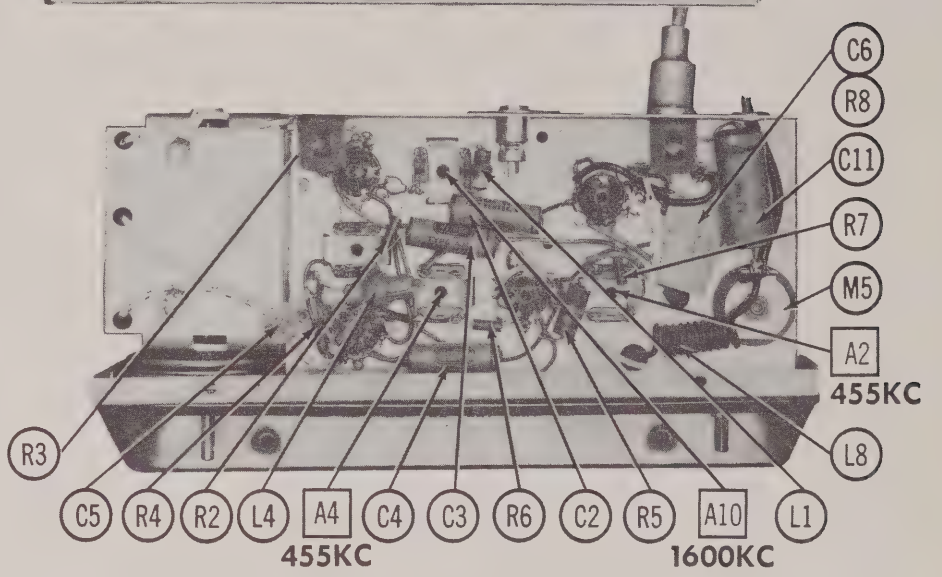
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AUTOMATIC PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A			307014. (SFE 14A)	155014	SFE14	HR1

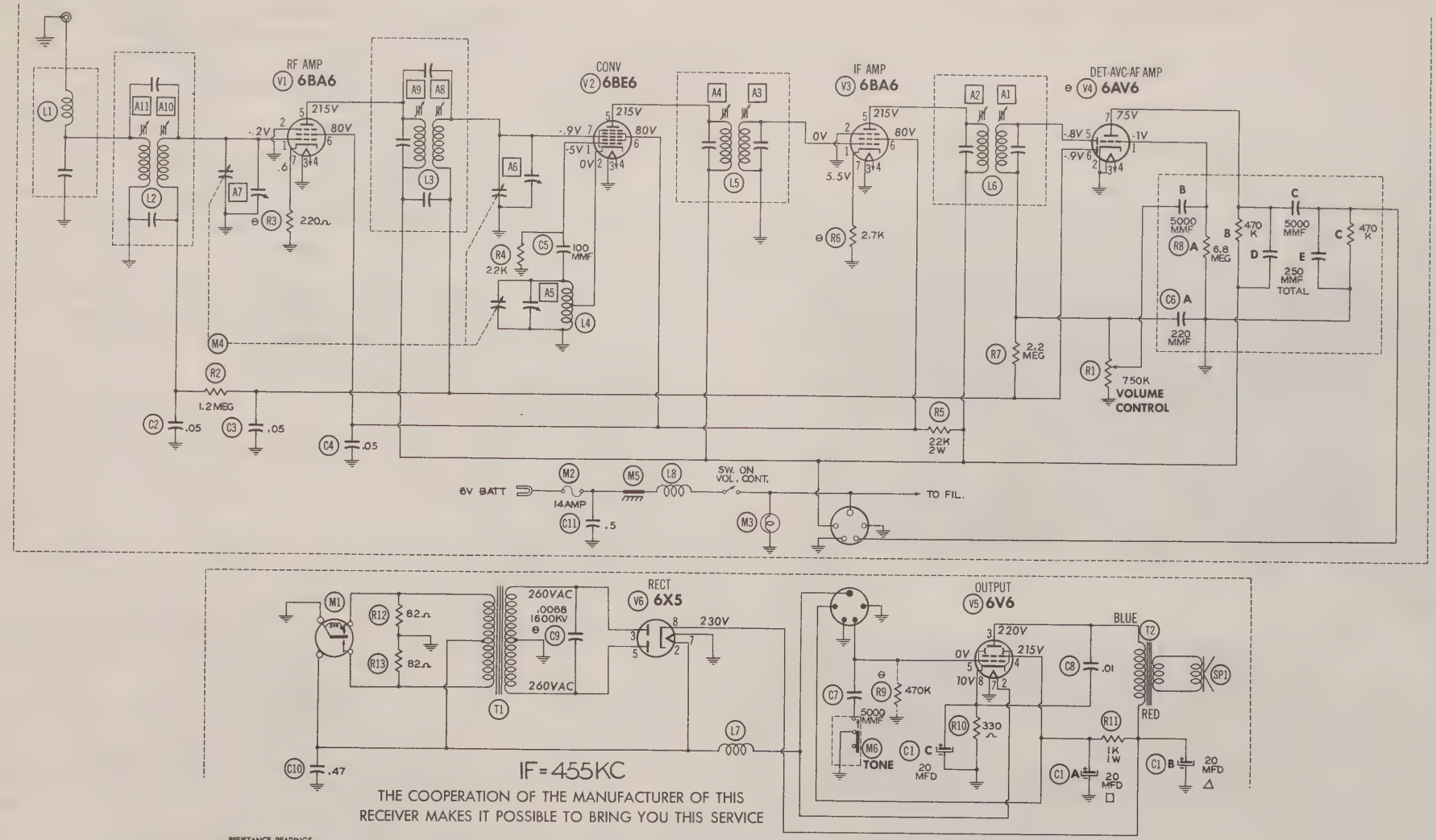
MISCELLANEOUS

ITEM No.	PART NAME	AUTOMATIC PART No.	NOTES
M3	Dial Light	T-47	#47
M4	Tuning Cap.	CV-100	3 Gang (16-370MMF, 16-370MMF, 30-185MMF)
M5	Spark Plate		
M6	Switch		Tone (SPST-Slide Type)

CHASSIS—BOTTOM VIEW







IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	4.2Meg	0Ω	0Ω	.4Ω	† 1KΩ	† 23KΩ	220Ω	
V 2	6BE6	22KΩ	.5Ω	0Ω	.4Ω	† 1KΩ	† 23KΩ	3Meg	
V 3	6BA6	15Ω	0Ω	0Ω	.4Ω	† 1KΩ	† 23KΩ	2.7KΩ	
V 4	6AV6	6.8Meg	0Ω	0Ω	.4Ω	750KΩ	3Meg	† 470KΩ	
V 5	6V6GT	NC	.4Ω	† 300Ω	† 1KΩ	470KΩ	NC	0Ω	330Ω
V 6	6X5GT	NC	.4Ω	400Ω	NC	400Ω	NC	0Ω	60KΩ

† MEASURED FROM PIN 8 OF V6
NC NO CONNECTION.

θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DIAL CORD STRINGING

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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OF
SHIP
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CHALLENGER
MODELS CH612, Y

CHALLENGER
MODELS CH612, Y

TRADE NAME	Challenger Models CH612, CH612Y
MANUFACTURER	Challenger Amplifier Co., 29 Ninth Ave., New York 14, N.Y.
TYPE SET	AC-Battery Operated 18 Watt Audio Amplifier With Manual Record Player
TUBES (Six)	Types 6SF5 Preamplifier, 6SF5 1st. AF Amplifier, 6SL7GT 2nd. AF Amplifier-Phase Inverter, (2) 6V6GT Output, 6AX5GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles (or) 6Volt Storage Battery (or) 12 Volt Storage Battery
RATING	.65 Amp. @ 117 Volts AC (or) 11 Amp. @ 6.3 Volts DC (or) 5.5 Amp. @ 12.6 Volts DC

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PARTS LIST AND DESCRIPTIONS

CHALLENGER
Model CH612

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre Amplifier	6SF5	
V2	1st AF Amplifier	6SF5	
V3	2nd AF Amp.-Phase Inv.	6SL7GT	
V4	Output	6V6GT	
V5	Output	6V6GT	
V6	Rectifier	6AX5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	Challenger PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	5	220 VAC		RR643	CRX3050	RP-3305			
C2A	▲8	500		AFH4-20	D018	FP474	TMQ19	Q-070	TVL-4830
B	▲8	500							
C	■8	500	Note 1						
D	8	500	Note 1						
C3A	▲5	450		AFH4-09	D008	WP433.6	TMQ9	Q-030	TVL-4750
B	■5	450							
C	▲5	450							
D	5	450							
C4	50	50		PRS50V50	BRH505	TC39	TD-50-50	FM-0550	TVA-1308
C5	100	25		PRS25V100	BRH251	TC2501	TD-100-25	MTH-2510	TVA-1207
C6	100	25		PRS25V100	BRH251	TC2501	TD-100-25	MTH-2510	TVA-1207

Note 1. C2C and C2D are not used.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	Challenger PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C7	.033	600		BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	
C8	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C9	.033	600		BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	
C10	330			SI330	DD-331	G056	811-331	UC-5333	5GA-T33	
C11	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C12	680			SI680	D6-681	K065	811-681	UC-5368	5GA-T68	
C13	2200			BPD-0022	DD-222	K073	811-0022	UC-5222	5HK-D22	
C14	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C15	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C16	.02	1200		P1688N-02		CUB16S2		PT1612	MB-S2	
C17	.01	600		BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C18	.047	200		BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C19	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C20	.1	400		P688N-1	DF-104	CUB4P1		PT401	4TM-P1	
C21	.22	200		P288N-22		CUB2P22		PT4022	2TM-P22	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Challenger PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES	
R1A	500KΩ	½	V202D	B-60	A47-500K-Z	Q13-133	U-48	Microphone Level	Note #1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A	
R2A	500KΩ	½	V202D	B-60	A47-500K-Z	Q13-133	U-48	Phono Level	Note #1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A	

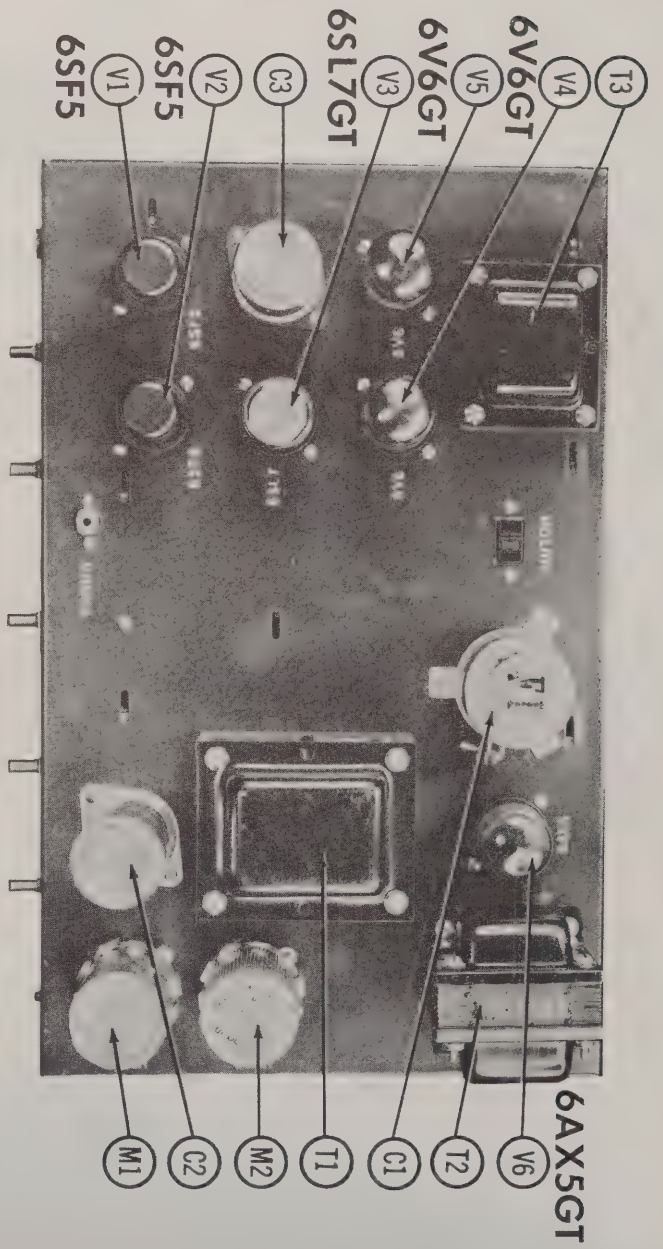
Note #1. Mfgr. Part #V367 Used In Some Versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Challenger PART No.	IRC PART No.	NOTES
R3	1Meg			BTS-1Meg	
R4	100KΩ			BTS-100K	
R5	100KΩ			BTS-100K	
R6	220KΩ			BTS-220K	
R7	470KΩ			BTS-470K	
R8	470KΩ			BTS-470K	
R9	100KΩ			BTS-100K	
R10	1000Ω			BTS-1000	
R11	47KΩ			BTS-47K	
R12	330KΩ			BTS-330K	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Challenger PART No.	IRC PART No.	
R13	82KΩ			BTS-82K	
R14	150KΩ			BTS-150K	
R15	1Meg			BTS-1Meg	
R16	100KΩ			BTS-100K	
R17	2200Ω			BTS-2200	
R18	100KΩ			BTS-100K	
R19	2200Ω			BTS-2200	
R20	47KΩ			BTS-47K	
R21	100KΩ			BTS-100K	
R22	8200Ω			BTS-8200	
R23	100KΩ			BTS-100K	
R24	270Ω	2		BTB-270	
R25	100KΩ	1			
R26	15KΩ	2		BTB-15K	
R27	250Ω	15		2D-250	
R28	2200Ω			BTS-2200	
R29	4700Ω	2		BTB-4700	
R30	22Ω	2			
R31	47Ω	1		BTA-47	
R32	4.7Ω				

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI. 1	PRI. 2	PRI. 3	SEC. 1	Challenger PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .65A	6VCT @ 1.5A	6VCT @ 1.5A	820VCT @ .073A	T878-12					
T2	6VCT @ 1A	6VCT @ 1A		117VAC @ Approx 150MA	T318-12					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Challenger PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	10.5KΩ	70V TAP @ 15Ω TAP @ 8Ω TAP @ 4Ω	T278						

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				Challenger PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6V	115∿	H507	5715	859	5515	
M2	Interrupter	6V	60∿	H505	5560		5560	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	Challenger PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M3		24 *P-12	N4-3	60 *2460		*Complete Tone Arm & Cartridge Assembly

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	Challenger PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M4		■ NY153 or ■ NY253		† WS-400	† Jewel ■ Nylon

MISCELLANEOUS

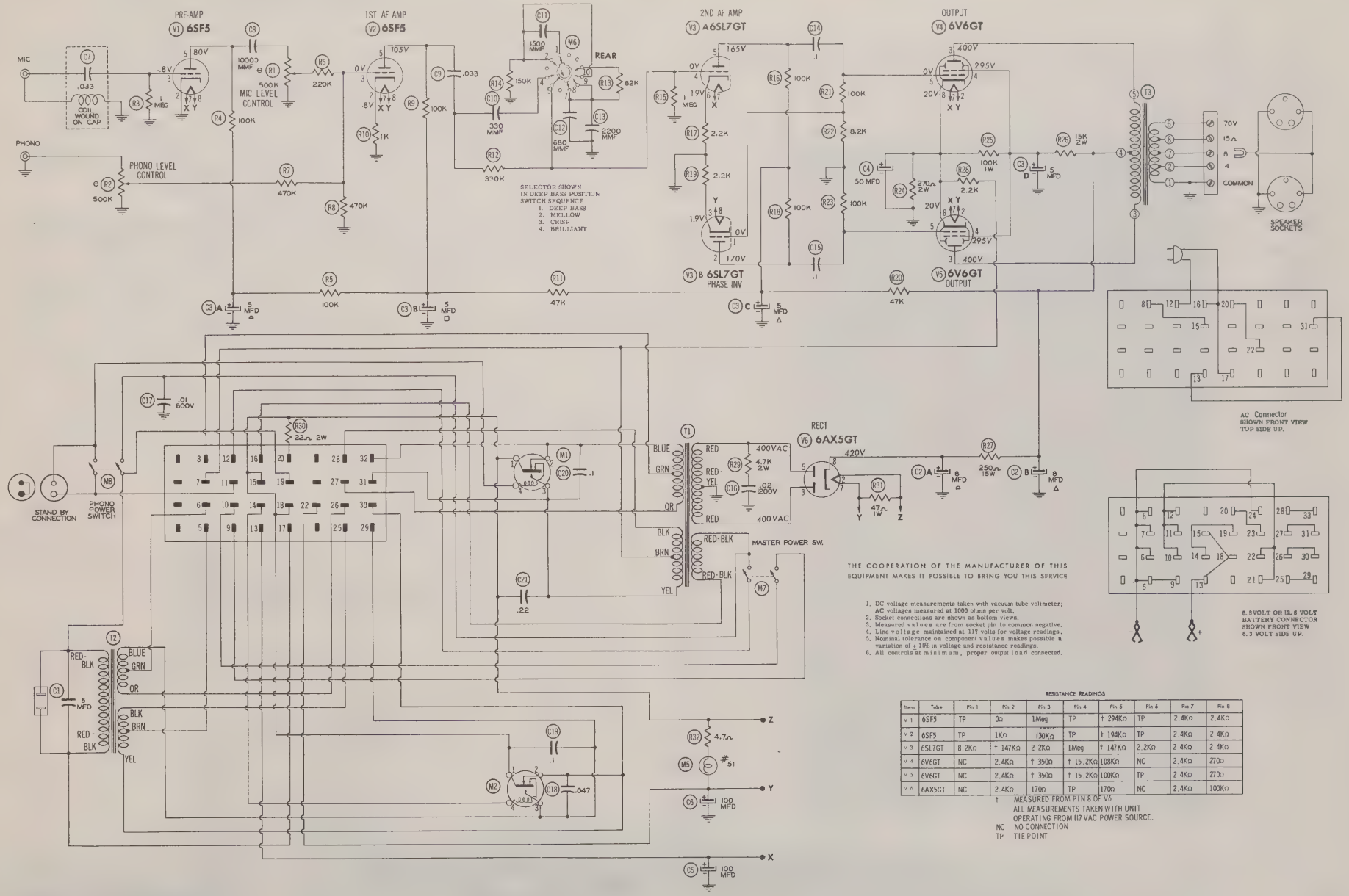
ITEM No.	PART NAME	Challenger PART No.	NOTES
M5	Pilot Light		#51
M6	Switch	S450	Tone Selector (Rotary, Wafer Type)
M7	Switch	S468	Master Power (On-Off) DPST
M8	Switch	S468	Phono Power (On-Off) DPST

CHASSIS—BOTTOM VIEW

SET 324 FOLDER 5

CHALLENGER Model CH612

CHALLENGER Model CH612



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	TP	0Ω	1Meg	TP	† 294KΩ	TP	2.4KΩ	2.4KΩ
V 2	6SF5	TP	1KΩ	130KΩ	TP	† 194KΩ	TP	2.4KΩ	2.4KΩ
V 3	6SL7GT	8.2KΩ	† 147KΩ	2.2KΩ	1Meg	† 147KΩ	2.2KΩ	2.4KΩ	2.4KΩ
V 4	6V6GT	NC	2.4KΩ	† 350Ω	† 15.2KΩ	108KΩ	NC	2.4KΩ	270Ω
V 5	6V6GT	NC	2.4KΩ	† 350Ω	† 15.2KΩ	100KΩ	TP	2.4KΩ	270Ω
V 6	6AX5GT	NC	2.4KΩ	170Ω	TP	170Ω	NC	2.4KΩ	100KΩ

† MEASURED FROM PIN 8 OF V6
ALL MEASUREMENTS TAKEN WITH UNIT OPERATING FROM 117 VAC POWER SOURCE.
NC NO CONNECTION
TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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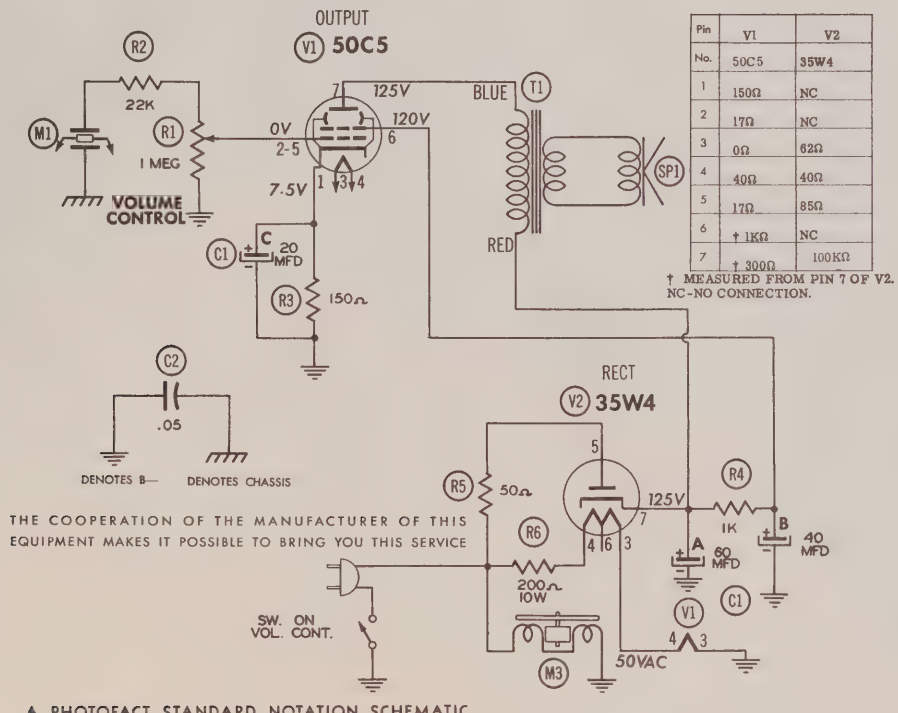
L. F. BLANKENSHIP
DENVER, COLORADO

CRESCENT
MODEL 1100

TRADE NAME	Crescent Model 1100
MANUFACTURER	Crescent Industries, 5900 Touhy Ave., Chicago 31, Ill.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Manual Record Player
TUBES (Two)	Types 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .24 Amp. @ 117 Volts AC



Pin No.	V1	V2
1	150Ω	NC
2	17Ω	NC
3	0Ω	62Ω
4	40Ω	40Ω
5	17Ω	85Ω
6	† 1KΩ	NC
7	† 300Ω	100KΩ

† MEASURED FROM PIN 7 OF V2.
NC-NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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324-6

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	NOTES
V1	Output	50C5	50C5	
V2	Rectifier	35W4	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: CRESCENT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	60	150		PRS1010D4A	BBRT8415C	TCT3117	TDLT-17	FMT-333	TVA-3455
B	40	150							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CRESCENT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CRESCENT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½		AB-70	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch			KB-1	SWE-12	76-1	US-26T	Attach to R1A.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½		BTS-22K	
R3	150Ω			BTS-150	
R4	1000Ω			BTS-1000	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R5	50Ω	½		BTS-50	
R6	200	10			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: CRESCENT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.3KΩ	3.3Ω		Z1101	A-3025	A-3332	26S58	S-12X	

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: CRESCENT PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	4"	PM	3.3Ω		4A07	223S1	

PHONO CARTRIDGE

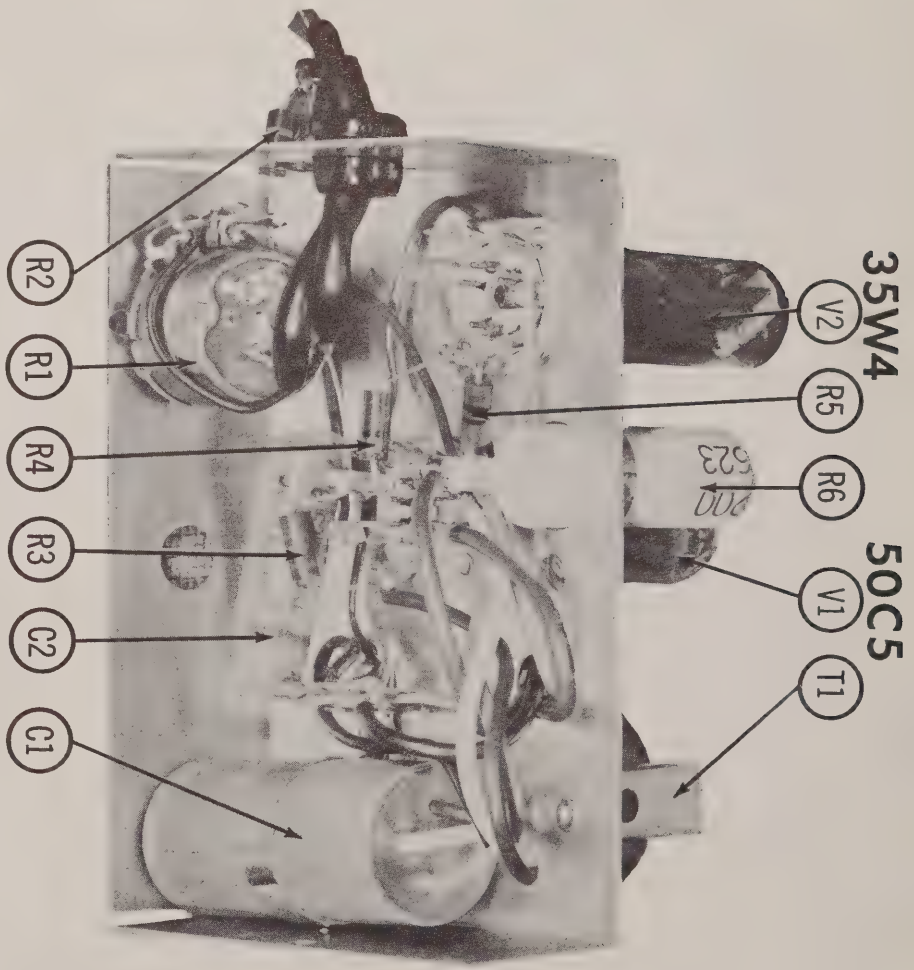
ITEM No.	REPLACEMENT DATA: CRESCENT PART No.	ASTATIC PART No.: CARTRIDGE	ASTATIC PART No.: NEEDLE	ELECTRO-VOICE PART No.: CARTRIDGE	ELECTRO-VOICE PART No.: NEEDLE	REMARKS
M1		16L3		60		

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: CRESCENT PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		* W-422 or * J-752	* B-379		* Metal

CHASSIS—BOTTOM VIEW



MISCELLANEOUS

ITEM No.	PART NAME	CRESCENT PART No.	NOTES
M3	Phono Motor		

PHOTOFACT* Folder

*TRADE MARK

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DENVER, COLORADO

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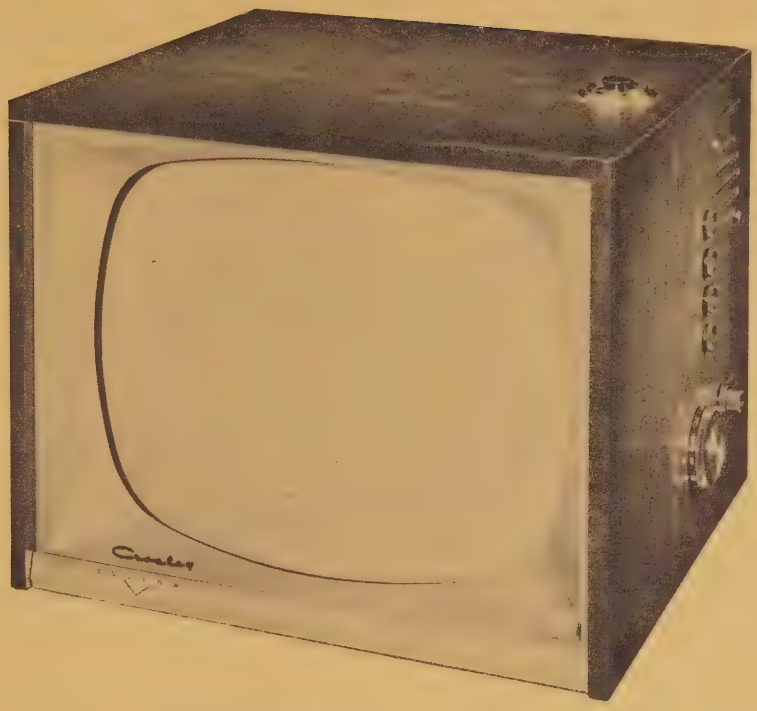
Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



CROSLEY MODEL J-21TKMF

TRADE NAME	Crosley	MODELS	CHASSIS
		J-21CKBF, J-21CKGF, J-21CKHF, J-21CKMF, J-21CSKMF, J-21CTKMF, J-21LKBF, J-21TKBF, J-21TKDBF, J-21TKDMF, J-21TKLBF, J-21TKLMF, J-21TKMF	472
		J-21CKBU, J-21CKGU, J-21CKHU, J-21CKMU, J-21CTKMU, J-21LKBU, J-21TKBU, J-21TKDBU, J-21TKD MU, J-21TKLBU, J-21TKLMU, J-21TKMU	473
MANUFACTURER	Crosley Corp., 1329 Arlington Street, Cincinnati, Ohio		
TYPE SET	Television Receiver		
TUBES	Seventeen		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.34 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

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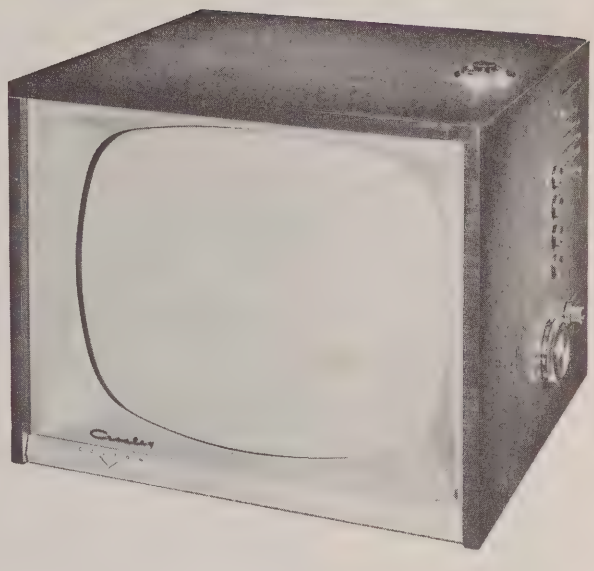
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 7 push-on type control knobs from side panel of cabinet.
2. Remove 6 wood screws. Remove rear cover.
3. Disconnect speaker leads.
4. Remove 6 metal screws and 3 wood screws holding cabinet to chassis mounting board.
5. Remove 2 wood screws from 2 chassis braces at the inside top of cabinet.
6. Remove 1 wood screw holding antenna terminal bracket.
7. Remove ends from "Zoom-A-Tenna".
8. Remove cabinet by lifting straight up from chassis mounting board.
9. Remove 2 speaker nuts. Remove speaker.



MODEL
J-21TKMF

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 2 wood screws holding metal molding at the bottom of the safety glass. Remove molding and safety glass. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

SPECIAL ADJUSTMENTS

A. AGC Level Control Adjustment

Turn the set on and tune in a medium to strong TV signal. Set contrast control fully clockwise so that area switch is in "Fringe" position. Set noise gate control fully counter clockwise.
Rotate the AGC control fully counter clockwise and note position of slot in shaft. Rotate the AGC control slowly clockwise to where the picture shows the first signal of overload and note the position of the slot in the shaft. Back the control off approximately 45 to 50% of this distance. Recheck all the stations available for sufficient contrast and no signs of overload. Reset the noise gate control if necessary.

B. Noise Gate Control Adjustment

Turn the set on and tune in a TV station. Turn the noise gate control (R9) fully counter clockwise. Then advance the control only far enough to stabilize the picture. The final adjustment of this control should be made on the strongest signal available.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Set horizontal hold control to the center range. Adjust the horizontal frequency slug (L31) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on tube side of chassis. (See tube location chart). Adjust the buzz control (R10) for maximum volume and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

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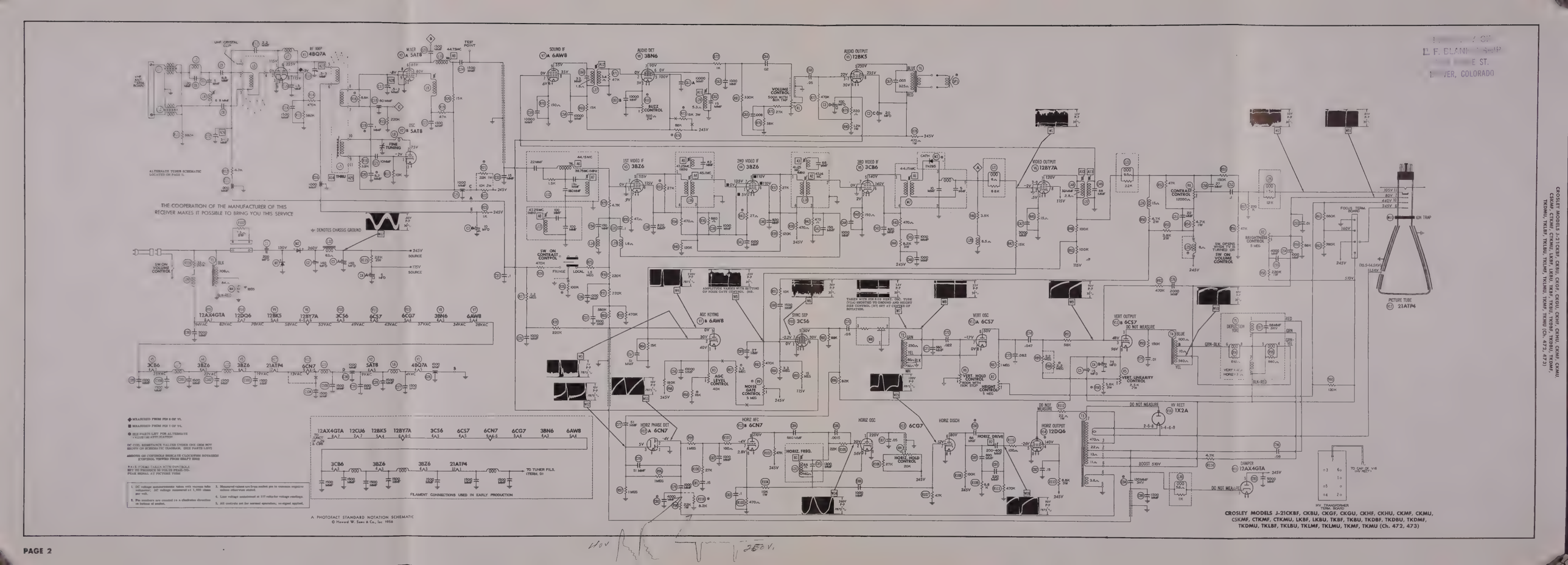
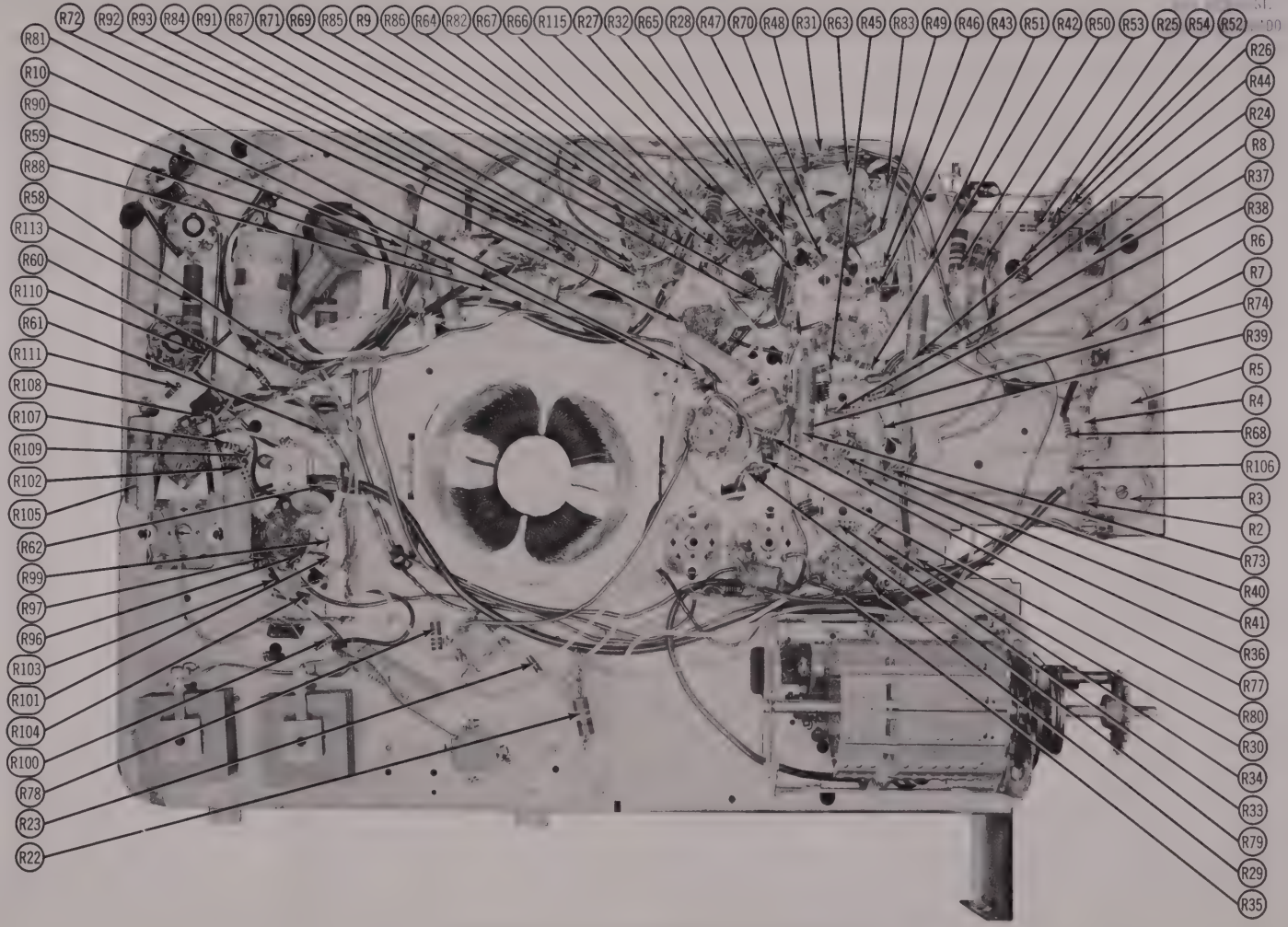

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 11.
DENOTES CHASSIS GROUND
SW. ON VOLUME CONTROL
245V SOURCE
115V SOURCE
12AX4GTA 12DQ6 12BK5 12BY7A 3CS6 6CS7 6CG7 3BN6 6AW8
3CB6 3BZ6 3BZ6 21ATP4 6CN7 5AT8 4BQ7A
SW. ON CONTRAST CONTROL
FRINGE
LOCAL
AGC KEYING
AGC LEVEL CONTROL 40K
NOISE GATE CONTROL 5 MEG
SYNC SEP 3CS6
VERT OSC 6CS7
VERT. HOLD CONTROL 150K SHAFT
HEIGHT CONTROL 5 MEG
VERT. LINEARITY CONTROL 2.5K 2W
VERT OUTPUT 6CS7
DO NOT MEASURE
HORIZ AFC 6CN7
HORIZ PHASE DET 6CN7
HORIZ. FREQ.
HORIZ OSC
HORIZ DISCH
HORIZ. DRIVE
HORIZ. HOLD CONTROL 20K
HORIZ OUTPUT 12DQ6
HV RECT 1X2A
DAMPER 12AX4GTA
BOOST 510V
CONTRAST CONTROL 12000
BRIGHTNESS CONTROL 5 MEG
SW. OPENS WHEN "S" IS TURNED ON SW. ON VOLUME CONTROL
FOCUS TERM. BOARD
ION TRAP
PICTURE TUBE 21ATP4
HV TRANSFORMER TERM. BOARD
TO CAP. OF V16
SOUND IF 6AW8
AUDIO DET 3BN6
AUDIO OUTPUT 12BK5
VOLUME CONTROL 500Ω WITH SW. ON TOP
BUZZ CONTROL 250Ω
1ST VIDEO IF 3BZ6
2ND VIDEO IF 3BZ6
3RD VIDEO IF 3CB6
VIDEO OUTPUT 12BY7A
AMPLIFIED KEYING PULSE SETTING OF NOISE GATE CONTROL (MR).
TAKEN WITH PIN 8 ON VERT. OSC TUBE CONNECTED TO GRID #1 OF PIN 1 ON VERT. SIZE CONTROL (M1) SET AT CENTER OF ROTATION.
RF AMP 4BQ7A
MIXER 5AT8
OSC 5AT8
TEST POINT
UHF CRYSTAL CONV.
FINE TUNING
TO TUNER FILS. (TERM. D)
FILAMENT CONNECTIONS USED IN EARLY PRODUCTION
◆ MEASURED FROM PIN 8 OF V1.
■ MEASURED FROM PIN 1 OF V4.
SEE PARTS LIST FOR ALTERNATE VOLTAGE SPECIFICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS OR CONTROLS INDICATE CLOCKWISE ROTATION (CW) VIEWED FROM SHAFT END.
R.M.S. VOLTAGES TAKEN WITH OSCILLOSCOPE SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured on 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1956
CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)
CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

L. F. BLANC
E ST.
VER, COLORADO

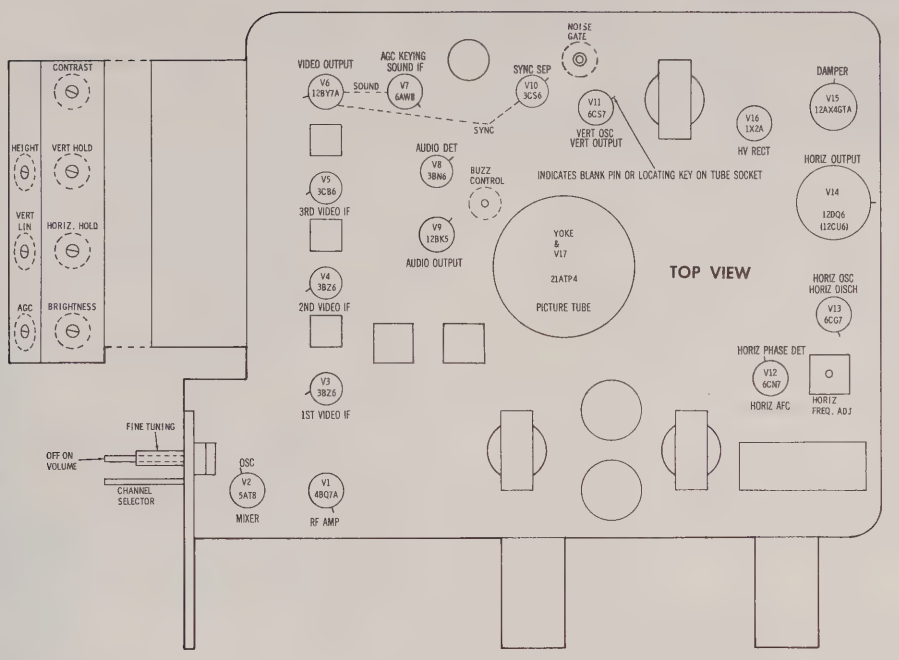


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKMF, CKMU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

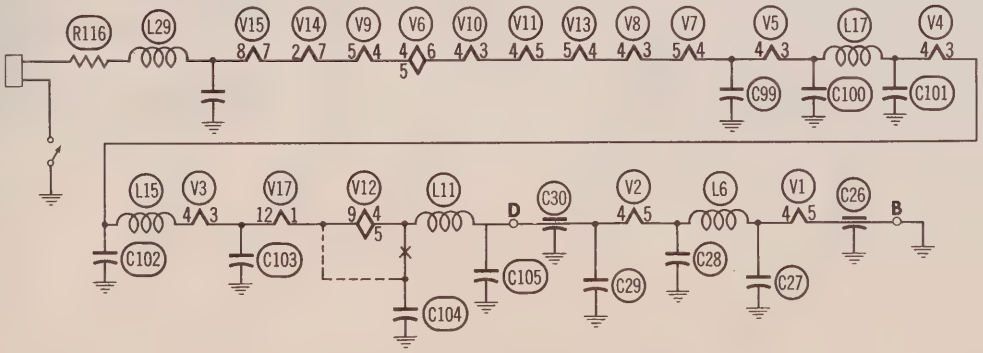
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V17**
Has pic, no sound - **V7, V8, V9**
Overloaded picture - **V7**

SYNC FAILURE
No vert. sync - **V10, V11**
No horiz. sync - **V10, V12, V13**
No vert. or horiz. sync - **V10**

SWEEP FAILURE
No raster, has sound - **V13, V14, V15, V16, V17**
No vertical deflection - **V11**
Poor vert. linearity or foldover - **V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, V15, V16, M1, M2**
Vert. off freq. - **V10, V11**
Horiz. off freq. - **V10, V12, V13**

NOTE: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative (See circuit below).



SET 324 FOLDER 7

CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an Isolated transformer to protect the equipment. The high voltage lead should be securely taped away from the chassis. Do not remove the horizontal oscillator tube (V13) to disable the high voltage.

VIDEO IF ALIGNMENT

Turn the contrast control to the minimum position. Connect the negative lead of a 3 volt bias battery to the ungrounded side of C31 and C32. Connect the positive lead to chassis. Attenuate generator output to maintain not more than two volts on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to point Ⓑ. Low side to chassis.	44.15MC	Any non-terfering channel	DC probe to point Ⓐ. Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	43.14MC	"	"	A2	Adjust for maximum deflection. If two peaks occurs, use peak nearest clip end of coil.
3.	"	"	41.25MC	"	"	A3	Adjust for MINIMUM deflection. The correct null point should occur when the core is farthest from the clip end of the coil. Repeat steps 2 and 3.
4.	"	"	45.1MC	"	"	A4	Adjust for maximum deflection. Use peak nearest clip end of coil.
5.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection. Use null point farthest from clip end of coil. Repeat steps 4 and 5.
6.	"	"	44.15MC	"	"	A6	Adjust for maximum deflection. Use peak nearest clip end of coil.
7.	"	"	39.75MC	"	"	A7	Adjust for MINIMUM deflection. Use null point farthest from clip end of coil . Repeat steps 6 and 7.
8.	"	"	47.25MC	"	"	A8	Adjust for MINIMUM deflection. Use null point farthest from clip end of coil.
9.	"	High side to point Ⓒ. Low side to chassis.	44.75MC	"	"	A9	Connect a 100Ω resistor in series with a .001MFD from pin 1 (grid) of 3BZ6 (V3) to chassis. Adjust A9 for maximum deflection. Remove 100Ω resistor and .001MFD capacitor from pin 1 of V3 to chassis.

OVERALL VIDEO IF RESPONSE CHECK

Leave bias connected as under "Video IF Alignment".
Use only enough sweep and marker generator output to provide usable pattern on scope.
If necessary to disable the local oscillator tube to reduce the possibility of erroneous indications, remove the converter tube from its socket and replace with a 5AT8 which has pin 2 removed.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Direct	High side to floating tube shield over dummy converter tube. Low side to chassis.	44MC (10MC Swp)	39.75MC 41.25MC 42.75MC 45.75MC 47.25MC	Any	Vert. Amp. to point Ⓐ. Low side to chassis.		Check for response similar to Fig. 1. If necessary, SLIGHTLY retouch A1, A2, A4, A6 and A9. Adjust A3 so that 41.25MC marker falls in trap notch. If markers are off a great deal, repeat "Video IF Alingment". Replace original 5AT8 in its socket.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Direct	High side to point Ⓐ. Low side to chassis.	Not used	4.5MC (400∿Mod)	Any	Vert. Amp. thru detector (Fig.2) to pin 11 (cathode) of picture tube. Low side to chassis.	A10	Adjust for MINIMUM 400∿ indication on scope.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Turn the set on and tune in a strong TV signal. Turn the buzz control (R10) 90° from maximum clockwise rotation. Adjust A11 for maximum volume. Reduce the signal strength into the receiver by inserting an attenuator in series with the antenna and the receiver antenna terminals. If a suitable attenuator is not available, remove the antenna from the antenna terminals and stray feed the signal into the receiver by placing the antenna near the antenna terminals. Adjust A12 and A13 for maximum volume. Adjust R10 for minimum noise. Reconnect antenna and readjust A11 for maximum volume. If necessary, reduce volume so that this peak can be heard.

ALTERNATE SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Set volume control at a low level.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Direct	High side to point Ⓐ. Low side to chassis.	4.5MC (7.5KC Swp)	4.5MC (400∿Mod)	Any non-interfer-ing channel	Across secondary of audio output trans-former (T6).	A11	Set buzz control (R10) 90 degrees from maximum clockwise rotation. Adjust A11 for maximum 400∿ indication on scope.
13.	"	"	"	"	"	"	A12, A13	Attenuate signal generator so that signal level is below the limiting level of the 3BN6 as evidenced by background hiss and noise. Adjust A12 and A13 for maximum response on scope.
14.	"	"	Not used	4.5MC (400∿ AM Mod)	"	"	R10	Use high signal generator output and adjust R10 for MINIMUM 400∿ indication on scope.
15.	"	"	4.5MC (4.5KC Swp)	4.5MC (400∿Mod)	"	"	A11	With volume control at low level, retouch A11 for maximum 400∿ indication on scope.

ALIGNMENT INSTRUCTIONS

VHF OSCILLATOR ALIGNMENT

Leave bias connected as under "Video IF Alignment".
Remove the dummy tube and replace the original 5AT8 in its socket.
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	57MC (10MC Swp)	55.25MC 59.75MC	2	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should fall at 40%.
			63MC (10MC Swp)	61.25MC 65.75MC	3		A15	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A16	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A17	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A20	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A21	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A22	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A23	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A24	
			213MC (10MC Swp)	211.25MC 215.75MC	13		A25	

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to the ungrounded side of C31. Connect positive lead to chassis. Connect the negative lead of a 3 volt bias supply to the ungrounded side of C32. Connect positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A26, A27, A28	Adjust for response curve similar to Fig. 4 with markers above 90%.
18.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel, make compromise adjustments of A26, A27 and A28 with channel switch turned to that channel. Recheck all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

The UHF portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver is not recommended in the field.

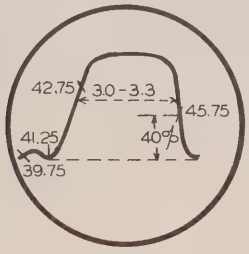


FIG. 1

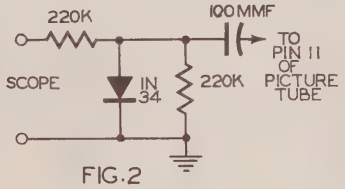


FIG. 2

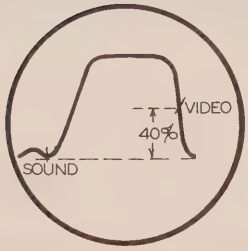


FIG. 3

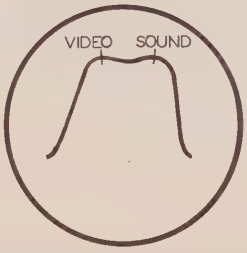
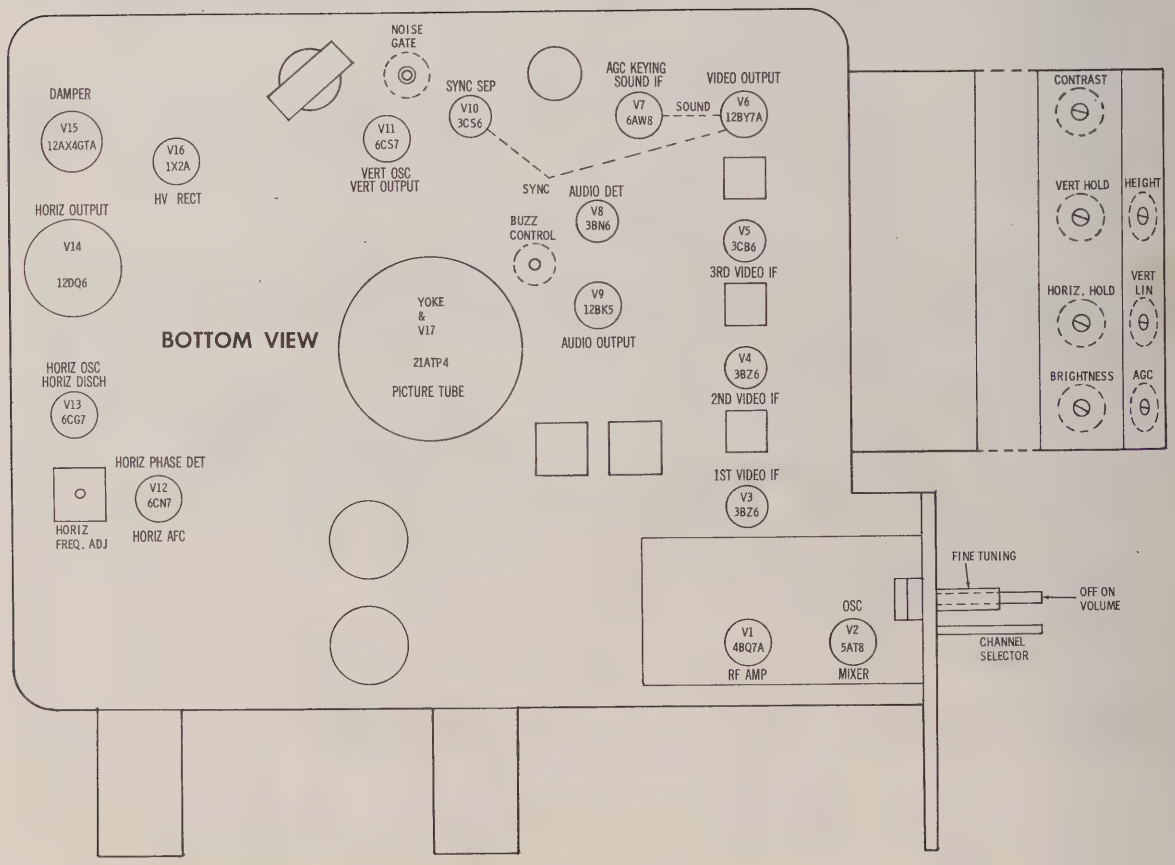


FIG. 4

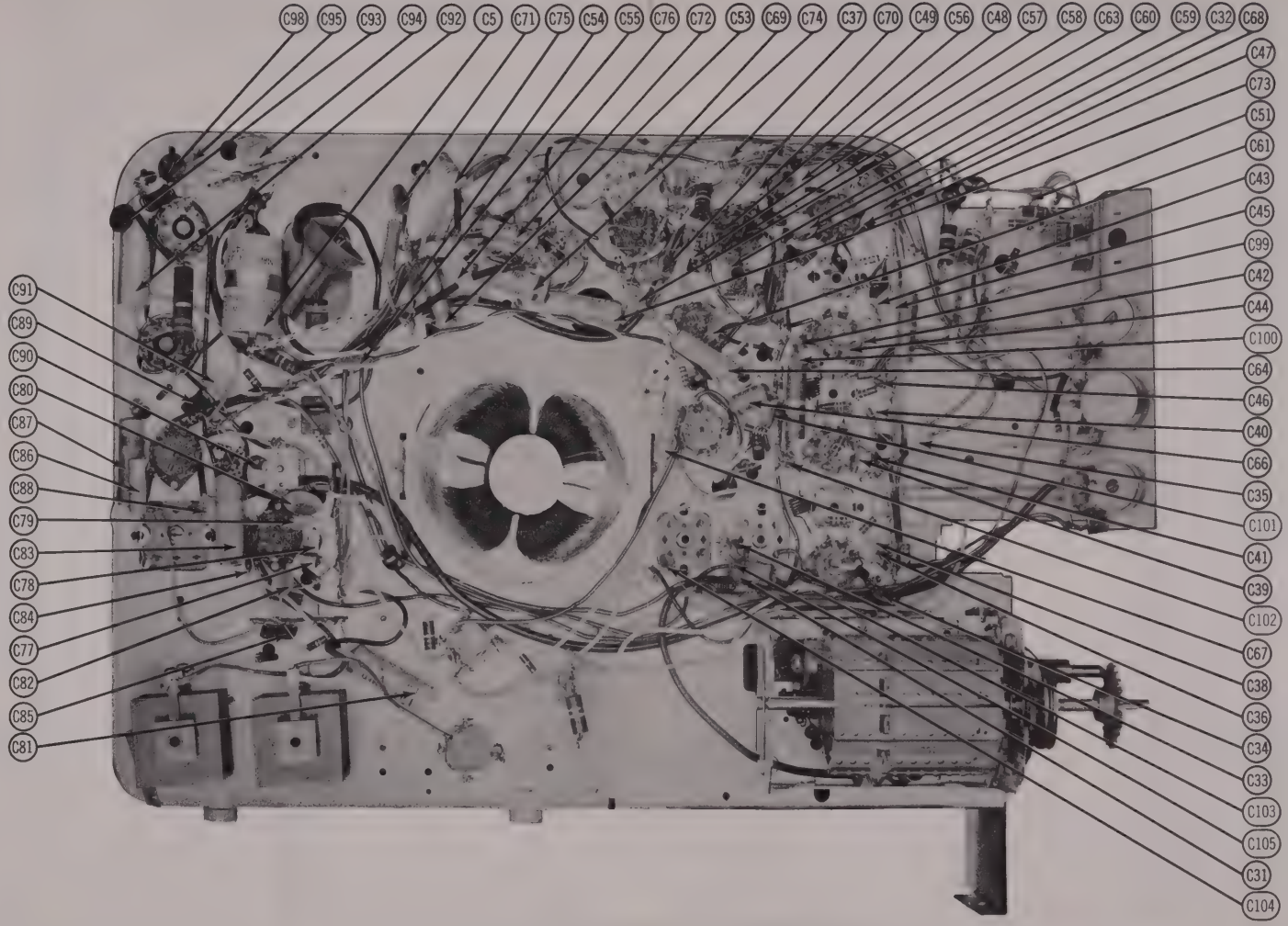
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	4BQ7A	INF	3Meg	0Ω	1Ω	0Ω	† 1KΩ	250KΩ	INF	0Ω
V 2	5AT8	10KΩ	† 14KΩ	0Ω	2Ω	1Ω	† 25KΩ	† 50KΩ	0Ω	220KΩ
V 3	3BZ6	550KΩ	47Ω	4Ω	5Ω	▲ 470Ω	▲ 470Ω	0Ω		
V 4	3BZ6	60KΩ	▲ 27Ω	5Ω	6Ω	† 500Ω	† 500Ω	60KΩ		
V 5	3CB6	470Ω	150Ω	6Ω	7Ω	† 8.7KΩ	† 8.7KΩ	0Ω		
V 6	12BY7A	15Ω	3.9KΩ	0Ω	14Ω	14Ω	13Ω	† 5KΩ	† 20KΩ	0Ω
V 7	6AW8	25KΩ	15KΩ	900KΩ	7Ω	8Ω	150Ω	.8Ω	† 25KΩ	† 25KΩ
V 8	3BN6	300Ω	3.4Ω	8Ω	9Ω	† 12KΩ	5.3Ω	† 330KΩ		
V 9	12BK5	† 800Ω	NC	470KΩ	14Ω	16Ω	1.4KΩ	470KΩ	† 500Ω	NC
V 10	3CS6	19KΩ	0Ω	12Ω	13Ω	40KΩ	1.4KΩ	2.5Meg		
V 11	6CS7	▲ 1.1KΩ	NC	2Meg	12Ω	10Ω	▲ 2.5Meg	400KΩ	60Ω	7KΩ
V 12	6CN7	0Ω	2Meg	1Meg	2Ω	2Ω	470Ω	3Meg	† 47KΩ	3Ω
V 13	6CG7	† 5KΩ	32KΩ	11KΩ	9Ω	10Ω	† 100KΩ	47KΩ	0Ω	0Ω
V 14	12DQ6	TP	18Ω	NC	† 6.8KΩ	470KΩ	TP	16Ω	0Ω	TOP CAP ▲ 50Ω
V 15	12AX4GTA	TP	NC	300KΩ	NC	† 63Ω	NC	18Ω	20Ω	
V 16	1X2A		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 520Ω
V 17	21ATP4	3Ω	▲ 300KΩ	PIN 6 † 63Ω	PIN 10 ▲ 100KΩ	PIN 11 † 40KΩ	PIN 12 4Ω			

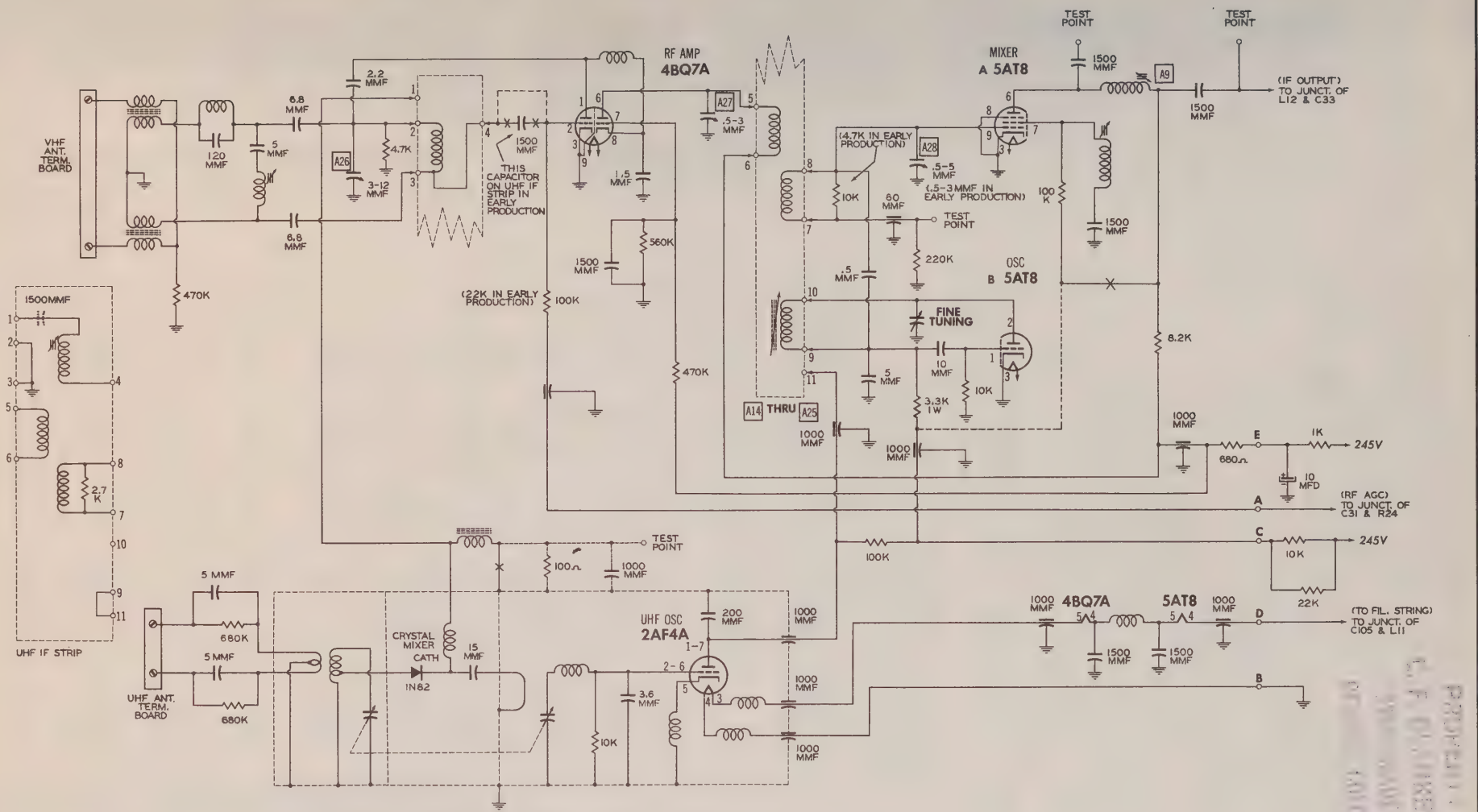
† MEASURED FROM OUTPUT OF M2.
▲ MEASURED FROM PIN 7 OF V4.
▲ MEASURED FROM PIN 3 OF V15.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTERNATE VHF-UHF TUNER SCHEMATIC

CROSLEY MODELS J-21CKBF, CKBU, CKGF, CKGU, CKHF, CKHU, CKMF, CKMU, CSKMF, CTKMF, CTKMU, LKBF, LKBU, TKBF, TKBU, TKDBF, TKDBU, TKDMF, TKDMU, TKLBF, TKLBU, TKLMF, TKLMU, TKMF, TKMU (Ch. 472, 473)

PROPERTY OF
E. F. BLANKENSHIP
3921 MEADE ST.

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	R.F Amplifier	6BQ7A	
V2	Mixer-Oscillator	6A7S	
V3	1st. Video IF Amplifier	3BE6	
V4	2nd. Video IF Amplifier	3BZ6	
V5	3rd Video IF Amplifier	3CB6	
V6	Video Output	1B3GTA	
V7	AGC Keying-Sound IF Amp.	6AW8	
V8	Audio Detector	3BN6	
V9	Audio Output	1BX6	

ITEM No	USE	TYPE	NOTES
V10	Sync Separator	5CB6	
V11	Vert. Osc.-Vert. Output	6CB7	
V13	Horiz. Phase Det.- Horiz. AFC	6CN7	
V13	Horiz. Osc.-Horiz. Disch.	6CG7	
V14	Horiz. Output	1D8GT	Note 1
V15	Damper	1LA4GTA	
V16	HV Rectifier	1X2A	

Note 1. 1DC8 used in early versions. Replace with 1D8GT.

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	CROSLEY PART No	CBS PART No	GENERAL ELECTRIC PART No	SYLVANIA PART No	
V17	21ATP4 ①	21ATP4 ①	21ATP4	21ATP4 ② 21ATP4A ③	① Aluminized ② Silver screen "B8" ③ Silver screen "B5"

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA							
	CAP.	VOLT	CROSLEY PART No	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No	PYRAMID PART No.	SANGAMO PART No	SPRAGUE PART No.	NOTES
C1	300	200	158557-1	E59B294	E210409	WS-342	D-100	D-100		R1640 *
C2	160	350	159903-1	E4A318	C150	FP537.6	TM-D60-350	D-117		R3155 *
C3A	40	350	159900-1	E4D980		FP420.28	Q-322	D-122		R3163 *
B	40	350						MT-4520		
C	20	350								
D	100	50								
C4A	25	350	159901-1	K3D409	BR835	FP223	TM-B0-150	T-S-085		R3164 *
B	75	150			A023		TD-S-350	FM-3508		
C5	15	525	159819-1	PR8600V30	BR8V1650	TC95	TD-10-600	MT-4530 †		R1197 *
								MT-4550		

† Connect units in series.
* Unit must be ordered from Mfgr.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	CROSLEY PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	120			BPD-00012	DD-121	CD44	811-121	UC-5312	5GA-T12	
C7	5			BPD-015	TC2-5R	2015	NPOA-4R7	ZT-5555	5TCCB-V47	
C8	6.8			BPD-015.8	TC2-6R8	2015	NPOA-6R8	ZT-5568	5TCCB-V68	
C9	6.8			BPD-015.8	TC2-6R8	2015	NPOA-6R8	ZT-5568	5TCCB-V68	
C10	3-12									
C11	1000									
C12	50			NPO-S12.2	TC2-3R2	2006	NPOA-2R2		5TCCB-V22	
C13	5.3				829-3		3115-01-ORS	CT565A		
C14	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C15	5.1			NPO-S12.5	TC2-5R1	2004	NPOA-5R5	ZT-5515	5TCCB-V15	
C16	1000									
C17	5-3				839-3		3115-01-ORS	CT565A		
C18	50									
C19	1			NPO-S01	TC2-1	TZ03	NPOA-010		5TCCB-V1	Note 1 Note 3
C20	8.3									
C21	10									
C22	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C23	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C24	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C25	1500									
C26	1000									
C27	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C28	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C29	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C30	1000									
C31	.1	150	157906-1	P288N-1	DF-104	CUB3P1		PT401	2TM-P1	
C32	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C33	15		1582615-51				N330K-150			
C34	150		1582615-55	N750-D100015	TCN-150	N046		N750-337-151	5TCU-T1	
C35	.1	150	157905-1	P288N-1	DF-104	CUB3P1		PT401	2TM-P1	
C36	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C37	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	1000		1644678-28	BPD-001	DD-102	K069	801-001		5HK-D1	
C39	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C40	680		1582615-53	839D		611-681	839-681		5GA-T68	
C41	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	150		1582615-35	N750-D100015	TCN-150	N046	N750-337-151		5TCU-T15	
C43	330		1582615-53							
C44	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C45	1000		1644678-28	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	1000		1644678-28	BPD-001	DD-103	K069	801-001	DC-531	5HK-D1	
C47	3000		1582615-28	BPD-003	DD-302	KD76	811-003	UC-535	5HK-D3	
C48	33		1577371-128	N080-S333						
C49	68		1577371-133							
C50	27		1577371-135							
C51	27		1577371-138	N080-S122						
C52	.1	150	157906-1	P288N-1	DF-104	CUB3P1		PT401	2TM-P1	
C53	.01	300	159001-1	BPD-01	DS-103	CUB401	GP3-333-103	PT41	4TM-S1	
C54	1000		1582615-42							
C55	4000		1582615-57							
C56	1000		1582615-34	BPD-01	DD-103	K083	811-01	DC-511	5HK-S1	
C57	51		1577371-29		TCN-51	TN13	N750K-510			
C58	10000		1582615-57	BPD-01	DD-103	K083	811-01	DC-511	5HK-S1	
C59	10000		1582615-57	BPD-01	DD-103	K083	811-01	DC-511	5HK-S1	
C60	33		1577371-126	N080-S333						
C61A	10000		1644678-28	BPD-2X01	DD3-103	DK083	811-01	DC-511	5HK-S81	
B	10000						811-01	DC-511		
C62	15		1577371-43							
C63	1000		1582615-57	BPD-001	DD-103	K069	801-001	DC-531	5HK-D1	
C64	.02	300	39001-80	BPD-02	DD-203	CUB3S2	817-02	PT413	2TM-S2	
C65	.006	600	39001-79	P488N-006		CUB4D6		PT628	6TM-D6	
C66	.05	150	170380-1	BPD-05	DF-503	CUB3S5		PT415	2TM-S5	
C67	.005	600	39001-11	S2500	DS-502	CUB4S5	GP2-253-502	PT625	6TM-D5	
C68	1500		1582615-61							
C69	27		1577371-136							
C70	.05	150	170380-1	BPD-05	DF-503	CUB3S5		PT415	2TM-S5	
C71	560		1644678-32	DI-00056	DD-561	G063	811-561	UC-5356	5GA-T56	
C72	.022	300	39478-63							
C73	.003	600	39478-97							
C74	.047	600	39478-65							

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	CROSLEY PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C75	.01	600	39478-61					MC1B497	MS-33	
C76	2000		1582615-64	1464-0003		1RSD2				
C77	51		157727-28		TCN-51	TN15	N750K-510			
C78	51		157727-28		TCN-51	TN15	N750K-510			
C79	1000		1582615-42	1464-0001		1RSD1		MC1B355	MS-21	
C80	4000		1582615-57	1464-0004		1RSD4		MC1B463	MS-24	Note 5
C81	.15	400	39001-30	P488M-15		CUB4P15		PT4015	4TM-P15	
C82	1000		1582615-43							
C83	.1	200	39001-16	P388N-1	DF-104	CUB3P1		PT401	2TM-P1	
C84	680		137499-33	1464-00068	D6-681	1RS768	811-681		MS-308	
C85	1500		137499-37	1464-0002		1RSD15		MC1B256	MS-315	
C86	.0015	400	39478-36	1464-0015		1RSD15	811-153	PT405	4TM-S5	
C87	.05	400	39001-17	BPD-05	DF-503	CUB4S5				
C88	1000		1582615-43							
C89	680		137499-32	1464-00068	D6-681	1RS768	811-681		MS-308	Note 4
C90	68		1582615-53							
C91	33		1582615-68			CUB4P15		PT4015	4TM-P15	
C92	.15	400	39001-30	P488-15						
C93	5000		144615-3	BPD-005	DD-502	KD80	811-005	DC-539	5HK-D5	
C94	120	3000	1582615-73		DD30-121				30GA-T12	Note 9
C95	1500		1582615-61	1464-0015		1RSD15	811-153	MC1B256	MS-315	
C96	.05	200	159439-1							
C97	68	3000	1582615-3	HVD-30-68	DD30-680	V3G68	3KV-680	DC30468	30GA-G68	
C98	5000		144615-2	BPD-005	DD-502	KD80	811-005	DC-539	5HK-D5	
C99	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C100	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C101	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C102	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C103	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C104	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C105	1500		144675-30	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	

Note 1. Some versions may use 1.5MMF in this application.
Note 2. Some versions may use 10MMF in this application.
Note 3. Some versions may replace C96 with two units- a 47MMF and an 68MMF, or a 56MMF and a 56MMF. Other versions may use 39MMF in this application.
No te 4. Chassis stamped Code E use 3300MMF unit. (Part #158215-68) in this application.
Note 5. Chassis stamped Code E use 3000MMF unit. (Part #158215-61) in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA						INSTALLATION NOTES
	RESIST. ANCE	WATTS	CROSLEY PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.		
R1A	500KΩ	½	B-159850-5		A47F3-500K		UT-430		Volume tapped at 60KΩ
B	Shaft		Not Req.		FS-3		Not Req.		Attach to R1A.
C	Switch		SWS-21		SWS-21		UB-28		Attach to R1A.
R2	5Meg	½	B-159871-1				Q17-141		Brightness
R3A	40KΩ	½	B-170501-14		† A8-40K-½		† QU-123		AGC Level
B	Not Req.		Not Req.		FKS-1/4		RQ		Not Req. Attach to R3A.
R4A	20KΩ	½	B-159866-1		B-22		A47-20K-S		Q11-119		TA2351.		Horiz Hold
B	Not Req.		Not Req.		FS-3		Not Req.		Not Req.		Attach to R4A.
R5A	2500Ω	2	B-159766-1		A43-2500		WPS2500		R2500L		Vert. Linearity-Wire Wound
B	Not Req.		Not Req.		FKS-1		Not Req.		D63S		Attach to R5A.
R6A	800KΩ with 150K stop	½	B-159338-1-2	★ B-69			★A47-500K-S		★Q11-138		★ TA16L.		Vert. Hold
B	Shaft		Not Req.		Not Req.		FS-3		Not Req.		Not Req.		Attach to R6A.
R7A	5Meg	½	B-159872-1		A3-87		A47-5Meg-S		Q11-141		TA5BL.		Height
B	Shaft		Not Req.		AK-1		FKS-½		RQ		Not Req.		Attach to R7A.
R8	12KΩ	½	B-159757-1										Contrast & Area Switch
R9A	5Meg	½	B-159875-1		A3-87		A47-5Meg-S		Q11-141		PTA5EL.		Hold-Sync-Note 1
B	Shaft		Not Req.		AK-1		FKS-½		RQ		Not Req.		Attach to R9A.
R10	500Ω	2	157855-2				39-500				Buzz-Wire Wound-Note 2		

Note 1. Some versions will use an alternate control Part No. 159872-1.
Note 2. Some versions will use an alternate control Part No. 170189-1.
† Versions with chassis code B control has a 15K stop , add series resistor.
★ Connect a 150KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CROSLEY PART No.	IRC PART No.	
R11	680KΩ		39374-59	BTS-680K	
R12	470KΩ		39374-53	BTS-470K	
R13	680KΩ		39374-59	BTS-680K	
R14	470KΩ		39374-57	BTS-470K	
R15	220KΩ		39374-53	BTS-220K	
R16	2000Ω		39374-35	BTS-2000	Note 1
R17	10KΩ		39374-27	BTS-10K	
R18	3900Ω		39374-38	BTS-3900	
R19	47KΩ		39374-45	BTS-47K	
R20	15KΩ		39374-39	BTS-15K	
R21	22KΩ	1	39374-43	BTA-22K	Note 3
R22	10KΩ	2	39374-313	BTB-10K	
R23	1000Ω		39374-25	BTS-1000	
R24	470KΩ		39374-57	BTS-470K	
R25	L. 5Meg		39374-66	BTS- L. 5Meg	
R26	100KΩ		39374-49	BTS-100K	Note 3
R27	2.2Meg		39374-69	BTS- 2.2Meg	
R28	220KΩ		39374-53	BTS-220K	
R29	4700Ω		39374-33	BTS-4700	
R30	220KΩ		39374-53	BTS-220K	
R31	470KΩ		39374-57	BTS-470K	
R32	27KΩ		39374-42		Note 4
R33	47KΩ		39375-41	BTS-470	
R34	47Ω		39374-9	BTS-47	
R35	680Ω		39374-29		
R36	27KΩ		39374-42		
R37	27KΩ		39374-42		
R38	470Ω		39374-31		
R39	150KΩ		39374-50	BTS-120K	
R40	150KΩ		39374-50	BTS-120K	
R41	47Ω		39374-5	BTS-47	Note 5
R42	470Ω		39374-41	BTS-470	
R43	47Ω		39374-41	BTS-470	
R44	6200Ω	9	39893-10		
R45	150Ω		39374-15	BTS-150	
R46	2900Ω		39374-33	BTS-2900	
R47	15KΩ		39374-39	BTS-15K	
R48	100KΩ		39374-49	BTS-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CROSLEY PART No.	IRC PART No.	
R49	15Ω		39374-3	BTS-15	
R50	4700Ω		39374-209	BTB-4700	
R51	10KΩ		39374-27	BTS-10K	
R52	47KΩ		39374-45	BTS-47K	
R53	3900Ω		39374-208	BTB-3900	
R54	470KΩ	1	39374-121	BTA-470K	
R55	150KΩ		39374-51	BTS-150K	
R56	47KΩ		39374-45	BTS-47K	
R57	270KΩ		39374-54	BTS-270K	
R58	220KΩ	1	39374-144	BTA-220K	
R59	68KΩ		39374-47	BTS-68K	
R60	120KΩ		39374-50	BTS-120K	
R61	680KΩ		39374-59	BTS-680K	
R62	390KΩ		39374-56	BTS-390K	
R63	100KΩ		39374-49	BTS-100K	
R64	15KΩ		39374-39	BTS-15K	
R65	560KΩ		39374-58	BTS-560K	
R66	180KΩ		39374-52	BTS-180K	
R67	5.6Meg		39374-84	BTS-5.6Meg	Note 3
R68	18KΩ		39374-41	BTS-18K	Note 6
R69	15KΩ		39374-39	BTS-15K	
R70	150Ω		39374-15	BTS-150	
R71	47KΩ		39374-45	BTS-47K	
R72	100KΩ		39374-25	BTS-1000	
R73	15KΩ	3	156911-11		Note 7
R74	68KΩ		39374-47	BTS-68K	Note 7
R75	27KΩ		39374-42	BTS-27K	
R76	56KΩ		39374-46	BTS-56K	
R77	470KΩ		39374-57	BTS-470K	
R78	470Ω	1	39374-109	BTA-470	
R79	220Ω		39374-17	BTS-220	
R80	1200Ω 5%	1	39374-114	BTA-1200	
R81	330KΩ		39374-55	BTS-330K	
R82	470KΩ		39374-57	BTS-470K	
R83	15Meg		39374-87	BTS-15Meg	
R84	5.5Meg		39374-73	BTS-5.5Meg	
R85	68KΩ		39374-47	BTS-68K	
R86	82KΩ		39374-48	BTS-82K	

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CROSLEY PART No.	IRC PART No.	
R87	1Meg		39374-61	BTS-1Meg	
R88	2.2Meg		39374-69	BTS-2.2Meg	Note 8
R89	2.2Meg		39374-69	BTS-2.2Meg	
R90	5600Ω	3	170173-4		
R91	56KΩ		39374-46	BTS-56K	
R92	470KΩ		39374-57	BTS-470K	
R93	150KΩ		39374-51	BTS-150K	
R94	680Ω		39374-29		
R95	680Ω		39374-29		
R96	1Meg		39374-61		
R97	1Meg		39374-61		
R98	22KΩ	1	39374-129		
R99	1Meg		39374-61		
R100	27KΩ		39374-42		
R101	100Ω		39374-13		
R102	47KΩ		39374-45		

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CROSLEY PART No.	IRC PART No.	
R103	470Ω		39374-21		
R104	10KΩ	1	39374-125		
R105	22KΩ		39374-41		
R106	27KΩ		39374-42		
R107	47KΩ		39374-45		
R108	100KΩ		39374-49		
R109	560Ω		39374-35		
R110	100Ω		39374-13		
R111	470KΩ		39374-57		
R112	330Ω		39374-03		
R113	680Ω	3	156911-6		
R114	470Ω		39374-129		
R115	22KΩ	2	39374-217		
R116	33Ω	20	158230-5		
R117	7.5Ω	5	156089-1		
R118	8300Ω		39374-36		Note 8

Note 1. Some versions use a 5800Ω ½W resistor in this application.
Note 2. Used in chassis 473 only.
Note 3. Not used on code "A" chassis.
Note 4. A 18KΩ ½W resistor is used on code "A" chassis in this application.
Note 5. A 47Ω 1W resistor is used on code "A" chassis in this application.
Note 6 A 12KΩ ½ W resistor is used on code "A" chassis in this application, some versions of code " B" chassis use a 10KΩ, ½W resistor in this application.
Note 7. In some versions, R73 and R74 are replaced with a 12KΩ 1W resistor.
Note 8 Not used in some versions.

TRANSFORMER (PILOT LIGHT)

ITEM No.	RATING			REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	CROSLEY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	HVAC Trap ① 6.3V				157913-1	P1851 ①	P3844 ①	P-8134 ①	21F28	F-12X

① Drill one new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA								
		CROSLEY PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Rola PART No	Stancor PART No	Thordarson PART No	Triad PART No	
T2	Vert. Osc. Trans	170349-1	B6704 1	A-3006 1		V405 2	A-8125 2	26A05 2	A-97X 2	
T3	Horiz. Output Trans.	159847-2								
T4	Vert. Output Trans	158726-2	Z1807	A-2824						
T5A	Yoke(90°)	158725-1 (22MH)	158426-1 ⅓	DF507	235D1	Y80F19/43	DY-16A	Y-16	Y-41-1	
B		Vert.(40MH)	155398-1 ⅓	MDF-22		Y80F19/44	DY-16			
			1 2 3	1 2 3		1 2 3	1 2 3	1 2 3	1 2 3	

1 Connect primary (yellow and black leads) between cathode and ground. Connect secondary (blue and green leads) between junction of capacitors C71 and C72 and ground. Connect terminal #2 of integrator to cathode (pin 8 of V11A). If no vertical sweep, reverse either primary or secondary connections
2 Connect primary (red and blue leads) between cathode and ground. Connect secondary (green and yellow leads) between junction of capacitors C71 and C72 and ground. Connect terminal #2 of integrator to cathode (pin 8 of V11A). If no vertical sweep, reverse either primary or secondary connections.
3 Does not include cover or beam centering magnets Crosley Part #153566-1.
4 Rear corner and centering device.
5 Use original rear cover and centering device.
6 Use original horizontal damping network.
7 To mount as original, loosen and rotate core clamp 180°. In this position connect horizontal damping capacitor across terminals #1 and #2. Jumper terminals #3 and #5. To mount with leads at bottom connect horizontal damping capacitor across terminals #3 and #1, jumper terminals #1 and #3.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA						NOTES
	PRI. SEC.	CROSLEY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	7.3KΩ 3-4Ω	149460	Z1113	A2831	A3738	24S52	S-7X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP	CROSLEY PART No.	QUAM PART No.	RCA TYPE No.	
SP1	8" x 12"	PM	3-4Ω	154812-1	52A1	21T51	1 Used in console models.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI	SEC	CROSLEY PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Matching Trans.	0Ω	0Ω					
L2	Ant. Matching Trans.	0Ω	0Ω					
L3	FM Trap	0Ω						
L4	IF Trap	2Ω						
L5	Ant., RF, Mixer Grid, Osc. Coils	0Ω						
L6	Fil. Choke	0Ω						
L7	Fil. Choke	0Ω						
L8	RF Coil	0Ω						
L9	RF Choke	0Ω						
L10	Coax. Plate	.1Ω						
L11	Fil. Choke	0Ω		158704-1	19-1000		4602	1 Microhenry
L12	1st Video IF	.1Ω		159039-1				Includes 39. 75MC Trap, a 56Ω resistor, 3 Caps. Includes Caps.
L13	47.25MC Trap	0Ω	0Ω	159933-1				
L14	RF Choke	0Ω		159447-1				
L15	Fil. Choke	0Ω		158704-1	19-1000		4602	1 Microhenries
L16	2nd Video IF	.1Ω	.1Ω	170339-1	17-5003 *	TV-128 *	6233 *	Includes 47.25MC Trap
L17	Fil. Choke	0Ω		158704-1	19-1000		4602	1 Microhenry
L18	3rd Video IF	.1Ω	.1Ω	170357-1	17-5002 *	TV-127 *	6232 *	Includes 41.25MC Trap
L19	RF Coil	1.6Ω		159443-1	19-1004		4650	6.5 Microhenries
L20	Shunt Peaking Coil	8.5Ω		170465-1	19-3180	TV-184	6130	185 Microhenries
L21	Series Peaking Coil	6Ω		170468-1	19-3098 *	TV-181 *	6177 *	82 Microhenries; Wound on 6.8KΩ resistor
L22	4.5MC Trap	2.8Ω		159420-2				
¶	1st Sound IF	.8Ω						
L23	Series Peaking Coil	6.5Ω		170681-1 ¶	19-3100 ▲		6113 ▲	105 Microhenries; Wound on 33KΩ resistor

CROSLEY MODELS 3-21CKBR, CKBU, CK6P, CK6U, CK6WP, CK6WU, CK6WT, CK6WV, CK6WAP, CK6WAT, CK6WAV, CK6WAU, CK6WAR, CK6WAS, CK6WAX, CK6WAY, CK6WAZ, CK6WBA, CK6WBB, CK6WBC, CK6WBD, CK6WBE, CK6WBF, CK6WBG, CK6WBH, CK6WBJ, CK6WBK, CK6WBL, CK6WBM, CK6WBN, CK6WBP, CK6WBQ, CK6WBR, CK6WBS, CK6WBT, CK6WBU, CK6WBV, CK6WBW, CK6WBX, CK6WBY, CK6WBZ, CK6WCA, CK6WCB, CK6WCC, CK6WCD, CK6WCE, CK6WCF, CK6WCG, CK6WCH, CK6WCJ, CK6WCK, CK6WCL, CK6WCM, CK6WCN, CK6WCP, CK6WCQ, CK6WCR, CK6WCS, CK6WCT, CK6WCU, CK6WCV, CK6WCW, CK6WCX, CK6WCY, CK6WCZ, CK6WDA, CK6WDB, CK6WDC, CK6WDD, CK6WDE, CK6WDF, CK6WDG, CK6WDH, CK6WDJ, CK6WDK, CK6WDL, CK6WDM, CK6WDN, CK6WDP, CK6WDQ, CK6WDR, CK6WDS, CK6WDT, CK6WDU, CK6WDV, CK6WDW, CK6WDX, CK6WDY, CK6WDZ, CK6WEA, CK6WEB, CK6WEC, CK6WED, CK6WEE, CK6WEF, CK6WEG, CK6WEH, CK6WEJ, CK6WEK, CK6WEL, CK6WEM, CK6WEN, CK6WEP, CK6WEQ, CK6WER, CK6WES, CK6WET, CK6WEU, CK6WEV, CK6WEW, CK6WEX, CK6WEY, CK6WEZ, CK6WFA, CK6WFB, CK6WFC, CK6WFD, CK6WFE, CK6WFF, CK6WFG, CK6WFH, CK6WFJ, CK6WFK, CK6WFL, CK6WFM, CK6WFN, CK6WFP, CK6WFQ, CK6WFR, CK6WFS, CK6WFT, CK6WFU, CK6WFV, CK6WFW, CK6WFX, CK6WFY, CK6WFZ, CK6WGA, CK6WGB, CK6WGC, CK6WGD, CK6WGE, CK6WGF, CK6WGG, CK6WGH, CK6WGJ, CK6WGK, CK6WGL, CK6WGM, CK6WGN, CK6WGP, CK6WGQ, CK6WGR, CK6WGS, CK6WGT, CK6WGU, CK6WGV, CK6WGW, CK6WGX, CK6WGY, CK6WGZ, CK6WHA, CK6WHB, CK6WHC, CK6WHD, CK6WHE, CK6WHF, CK6WHG, CK6WHH, CK6WHJ, CK6WHK, CK6WHL, CK6WHM, CK6WHN, CK6WHP, CK6WHQ, CK6WHR, CK6WHS, CK6WHT, CK6WHU, CK6WHV, CK6WHW, CK6WHX, CK6WHY, CK6WHZ, CK6WJA, CK6WJB, CK6WJC, CK6WJD, CK6WJE, CK6WJF, CK6WJG, CK6WJH, CK6WJJ

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L24	Shunt Peaking Coil	15Ω		170467-1	19-3500		6138	480 Microhenries
L25	Shunt Peaking Coil	6Ω		170652-1	19-3093	TV-181	6177	95 Microhenries; Not used in chassis 472, 473 Code A
L26	Series Peaking Coil	11.5Ω		159397-1	19-3250 ♦	TV-185 ♦	6130 ♦	95 Microhenries; Wound on 12KΩ resistor
L27	2nd Sound IF	1.8Ω	3.4Ω	170138-1				
L28	Quadrature Coil	5.3Ω		157842-1			1480	
L29	Fil. Choke	0Ω		159974-1	19-1001		4604	1.5 Microhenries
L30	RF Choke	5.8Ω		159463-1	19-3100 †	TV-181 †	6112 †	102 Microhenries, Wound on 1KΩ resistor

* Use adaptor plate.
■ Parallel with 6.8KΩ resistor.
▲ Parallel with 22KΩ resistor.
♦ Parallel with 12KΩ resistor.
† Parallel with 1KΩ resistor.
¶ Part No. 170255-1 used in chassis 472, 473-Code A.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L31	225Ω		159943-1							Tapped ⓐ 140Ω

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: CROSLEY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L32	.250A	63Ω	1.1HY	155529-4-1	C5037 ①			26C44 ①	C-23X ①

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: CROSLEY PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.250A	155575-2	1236A	MR300	6S300	6Q4	300	
M2	.250A	155575-2	1236A	MR300	6S300	6Q4	300	

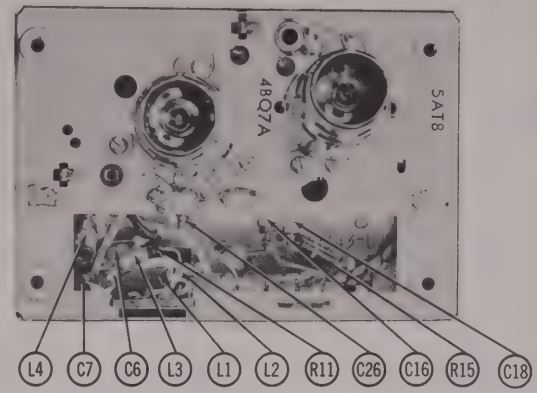
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: SYLVANIA PART No.	NOTES
M3	1N295 *	157465-5	1N60	Video Det.

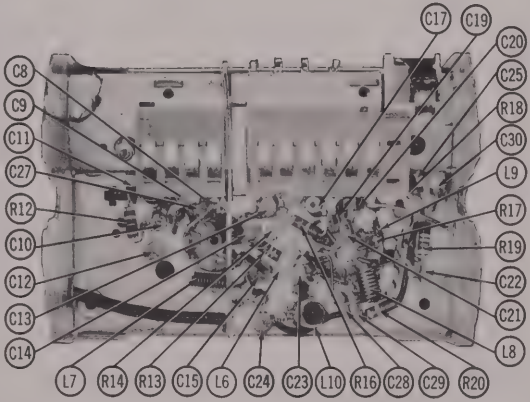
* Some versions may use crystal diode type CK706A in this application.

MISCELLANEOUS

ITEM No.	PART NAME	CROSLEY PART No.	NOTES
M4	Pilot Light	170168-1	#1855
M5	Tuner	159725-1	VHF-Chassis 472
M6	Tuner	159698-1	VHF-UHF Combination-Chassis 473
M7	Video Det. Assy.	170499-1	Includes Coils, Capacitors; Less M3.
M8	Integrator	170203-1	Vertical-Centralab Part No. PC-104, Sprague Part No. 103C12
M9	Centering Device	153586-1	Includes Deflection Yoke (T5) Rear Cover
M10	Ion Trap	153109-2	
B2	Trimmer Cap.	159882-1	Horiz. Drive (200-400MMF)
	Cabinet	170218-1	Models J-21TKMF, J-21TKMU, J-21TKLMF, J-21TKLMU.
	Cabinet	170218-2	Models J-21TKBF, J-21TKBU, J-21TKLBF, J-21TKLBU.
	Cabinet	170232-2	Models J-21LKBF, J-21LKBU.
	Cabinet & Base	170303-1	Models J-21CKMF, J-21CKMU.
	Cabinet & Base	170303-2	Models J-21CKBF, J-21CKBU.
	Cabinet	159833-1	Models J-21TKDMF , J-21TKDMU.
	Cabinet	159833-2	Models J-21TKDBF, J-21TKDBU.
	Cabinet	170105-1	Models J-21CTKMF, J-21CTKMU
	Cabinet	170303-4	Models J-21CKGF, J-21CKGU
	Cabinet	170303-3	Models J-21CKHF, J-21CKHU
	Cabinet	159953-1	Model J-21CSKMF
	Mask	170019-1	All Models Except J-21CSKMF
	Mask	171025-1	Model J-21CSKMF
	Safety Glass	159054-5	All Models



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW

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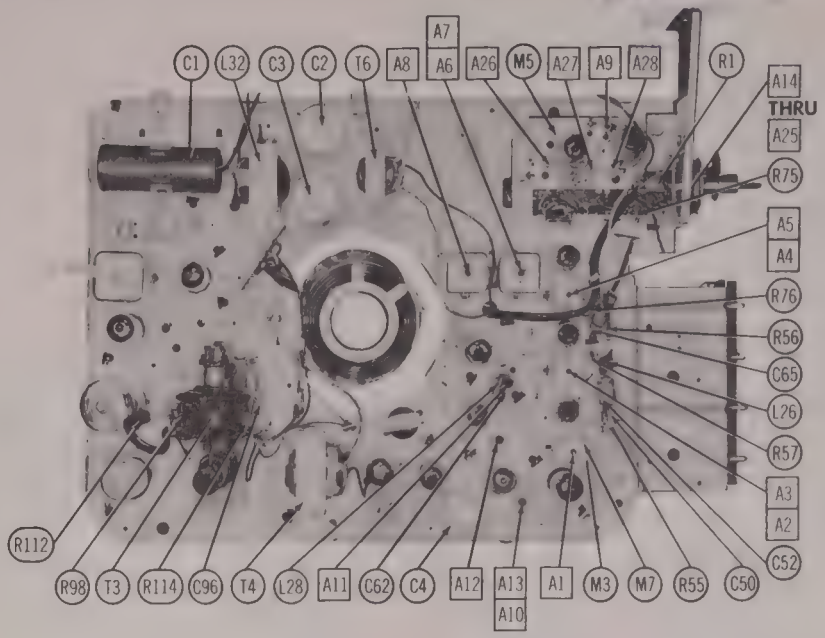
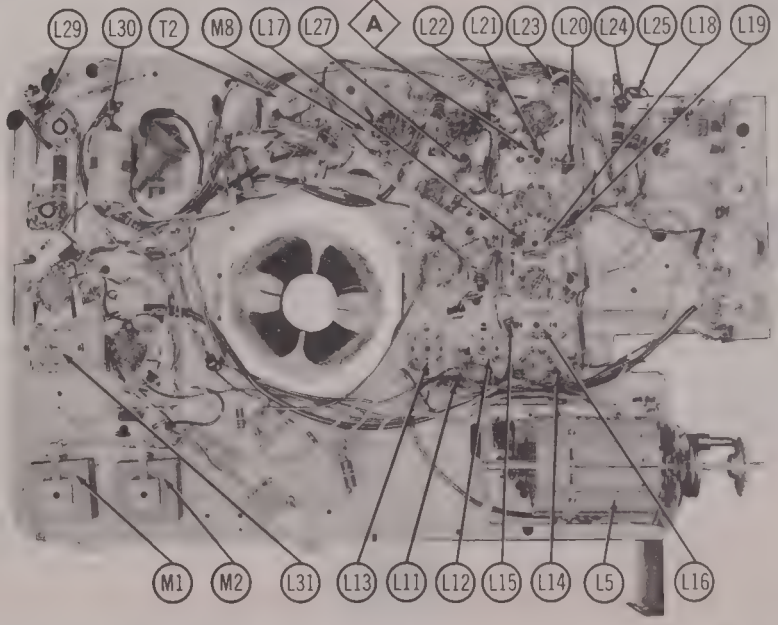
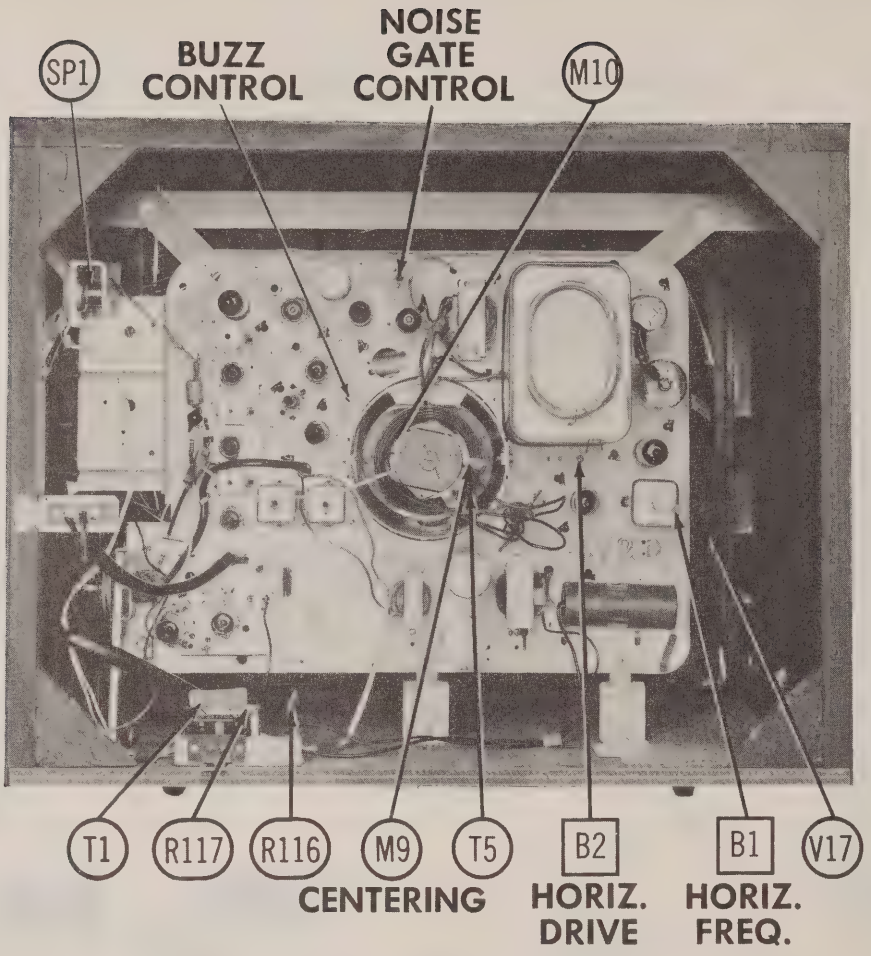


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

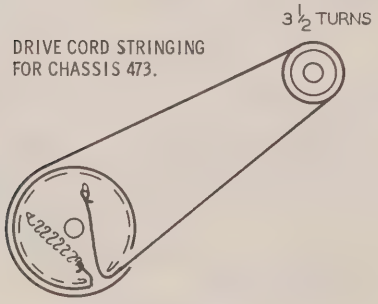
1. Set the horizontal hold control fully clockwise. Adjust the horizontal frequency slug (B1) until picture locks in. (Be sure that noise gate is not advanced too far).

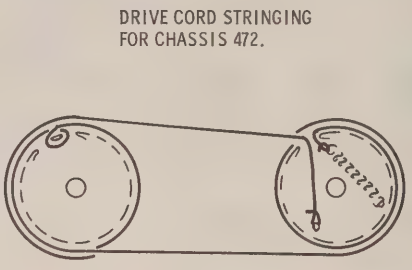
2. Adjust counter clockwise until picture goes out of sync.

3. Adjust slowly clockwise until picture just falls into sync.

4. Adjust horizontal hold control to the center of its range. When the horizontal frequency slug (B1) is properly adjusted, the picture will remain in sync when the channel switch is turned off channel and back again when the control is set near either end of its range.

5. Using nonconducting screwdriver, turn the horizontal drive control (B2) in until a bright vertical line appears in the picture, then back off on the adjustment until line disappears.





UHF DRIVE CORD STRINGING

DUMONT CHASSIS RA-352

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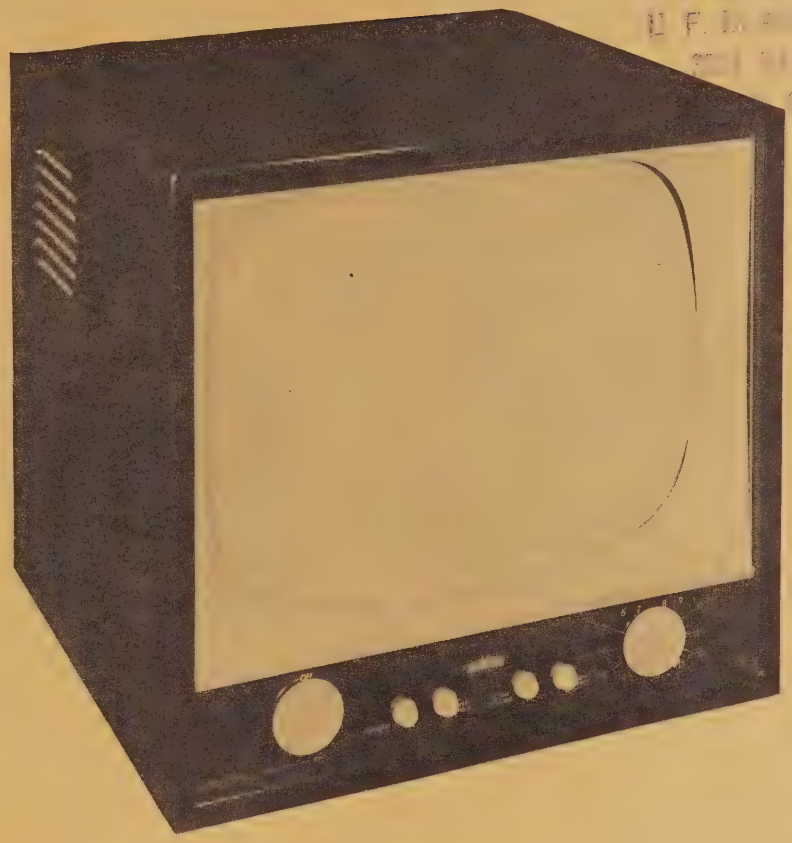

DUMONT
CHASSIS RA-352

TRADE NAME	Dumont Chassis RA-352
MANUFACTURER	Allen B. Dumont Laboratories, Inc., 257 Sixteenth Ave., Paterson, N.J.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycle — RATING 1.6 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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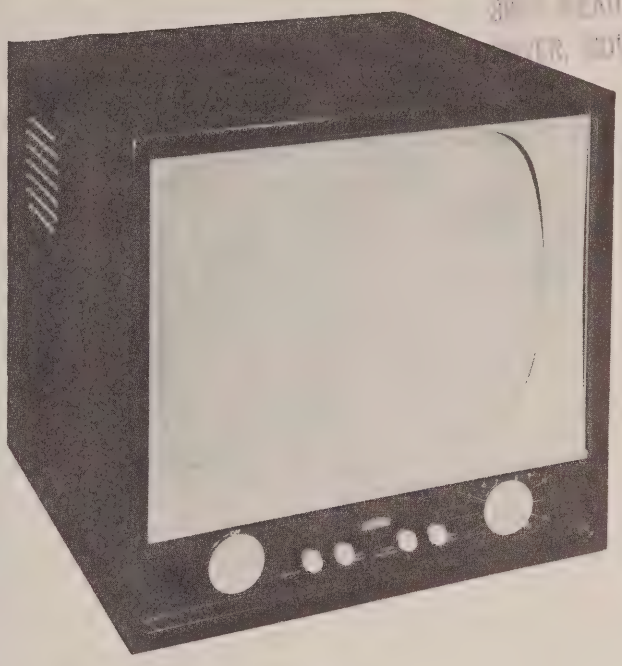
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 4 metal screws. Remove rear cover.
3. Remove picture tube socket, yoke plug, HV lead and speaker leads.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 2 speaker nuts. Remove speaker.



CHASSIS

RA-352

DUMONT
CHASSIS RA-352

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 3 metal screws holding metal strip at the top edge of the safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See Tube Placement Chart on Page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control to its mid-range position and adjust the horizontal stabilizer slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A11) located on top of the chassis.

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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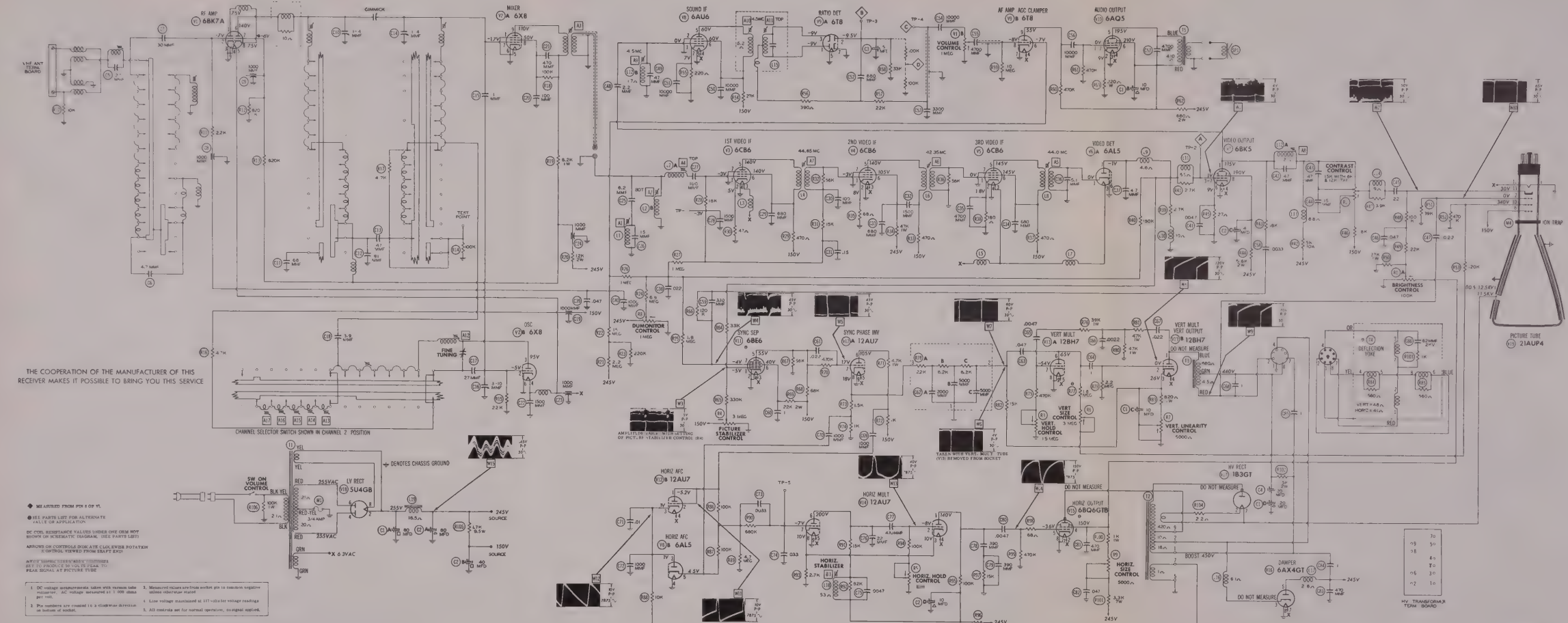
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1956
DUMONT CHASSIS RA-352

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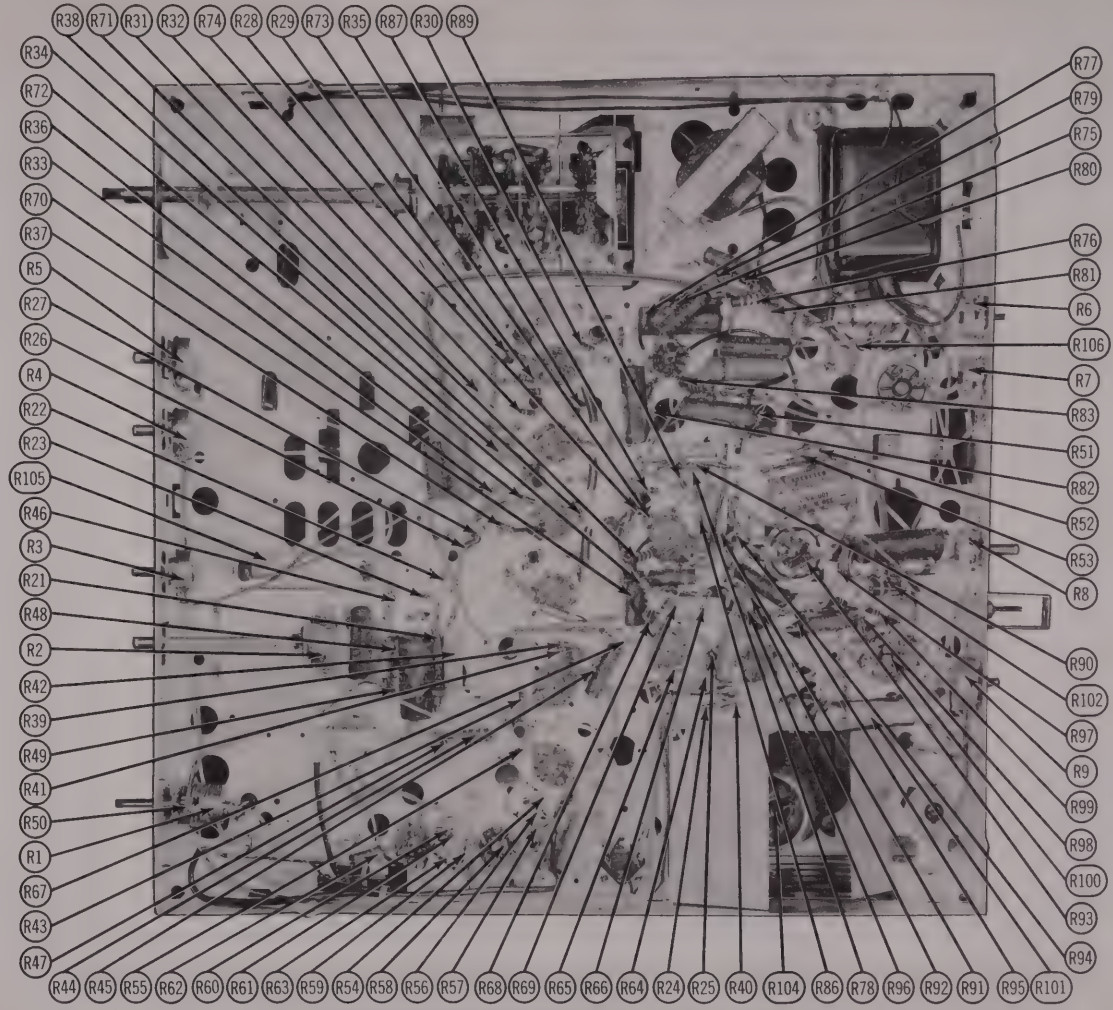

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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CHASSIS RA352

TUBE PLACEMENT CHART

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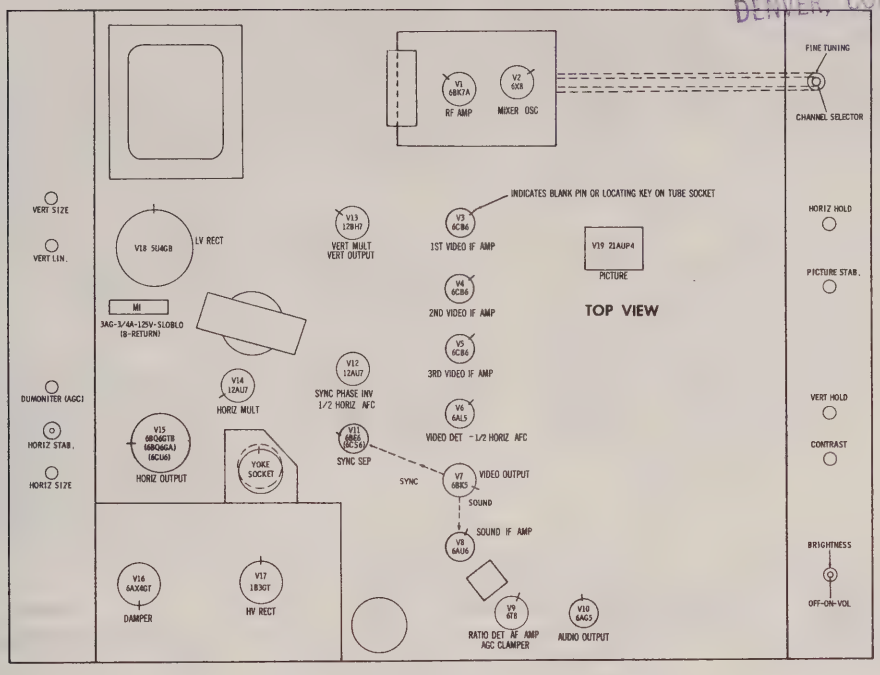

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V18, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V7
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V19
Has pic, no sound - V8, V9, V10
Overloaded picture - V9

SYNC FAILURE
No vert. sync - V12, V13
No horiz. sync - V12, V14
No vert. or horiz. sync - V11, V12

SWEEP FAILURE
No raster, has sound - V14, V15, V16, V17, V19
No vertical deflection - V13
Poor vert. linearity or foldover - V13
Poor horiz. linearity or foldover - V14, V15, V16
Narrow picture - V14, V15, V16, V17, V18
Vert. off freq. - V12, V13
Horiz. off freq. - V12, V14

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Remove Horizontal Output tube (V15) and the damper tube (V16).
Connect yoke, speaker and picture tube during alignment.

VIDEO IF ALIGNMENT

Disable local oscillator by replacing the mixer-oscillator tube (V2) with one having pin 3 clipped off. Connect the high side of the signal or sweep generator to a floating shield over the dummy 6x 8.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to floating shield over dummy 6X8. Low side to chassis.	43. 5MC (10MC Swp.)	41. 25MC 42. 25MC 45. 75MC	Any	Vert. amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V3). Low side to chassis.	A1, A2, A3, A4	Use only enough sweep generator output for useable pattern on scope. Adjust A1 thru A5 for response curve similar to Fig. 2. Adjust A1 to place 41. 25MC trap marker. A2 places 42. 25MC marker approximately 55% on response curve. Adjust A3 and A4 to place 45. 75MC marker at 70% on response curve and correct tilt. Repeat step 1 until markers are in correct positions as in Fig. 2.
2.	"	"	Not used	44. 0MC	"	Use VTVM DC probe to point (A). Common to chassis.	A5	Attenuate generator output to maintain not more than 2 volts on VTVM. Adjust for maximum deflection.
3.	"	"	"	42. 35MC	"	"	A6	"
4.	"	"	"	44. 85MC	"	"	A7	"
5.	"	"	43. 5MC (10MC Swp.)	41. 25MC 42. 25MC 45. 75MC	"	Use scope. Vert. amp. thru 27KΩ to point (A). Low side to chassis.		Connect the negative lead of a 5 volt bias supply to the ungrounded side of C31. Positive lead to chassis. Check for response curve. similar to Fig. 3. If necessary, retouch A5, A6 and A7 for desired response. Adjust A6 to place 42. 25MC marker at 50% on response curve. Adjust A7 to place 45. 75MC marker at 50% on high side of response curve. A1 places 41. 25MC trap markers. Adjust A5 for MINIMUM dip and tilt. Do not readjust A2, A3 and A4.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to point (A). Low side to chassis.	Not used	4. 5MC (400∿ Mod)	Any	Vert. amp. thru detector (Fig. 1) to pin 11 (cathode) of picture tube. Low side to chassis.	A8	Adjust for MINIMUM 400∿ indication on scope.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to point (A). Low side to chassis.	4. 5MC (450KC Swp)	4. 5MC	Any	Vert. amp. to point (B). Low side to chassis.	A9, A10	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
8.	"	"	"	"	"	Vert. amp. to point (C). Low side to chassis.	A11	Reconnect stabilizing capacitor C3. Adjust so that 4. 5MC marker occurs at crossover lines as in Fig. 5. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines. Replace original 6X8 in its socket.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ(± 1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	Direct	High side to point (A). Low side to chassis.	4. 5MC (Unmod.)	Any non-interfering channel	DC probe to point (B). Common to chassis.	A9, A10	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (C). Common to point (D).	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Remove 100KΩ resistors. Replace original 6X8 in its socket.

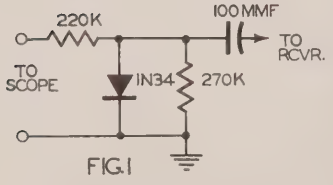

FIG.1

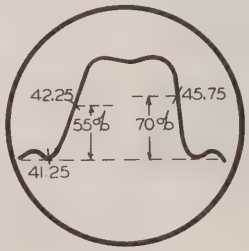

FIG. 2

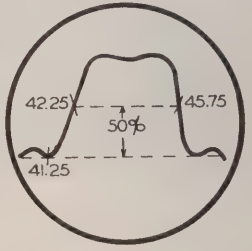

FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

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DENVER, COLORADO

OSCILLATOR ALIGNMENT

Set the fine tuning control to the center of its range. Set the channel selector to the highest high-band channel station operating in the area. Adjust the high band oscillator adjustment (A12) for best picture detail. Check all other high-band stations available. If one fails to come in range of the fine tuning, it may be necessary to compromise by retouching A12.
Set the channel selector to each low-band channel (2-6) operating in the area. Adjust the proper oscillator slug for each channel in turn for best picture detail. A13 is for channel 6, A14 for 5 etc. If a slug does not have sufficient range for a particular channel, it may be necessary to adjust the slug intended for the next higher channel.

VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

UHF TUNER ALIGNMENT

In the event the UHF oscillator tube is replaced, it is recommended that several tubes be tried and the one which works best should be used.
Alignment of the UHF tuner is not recommended in the field.

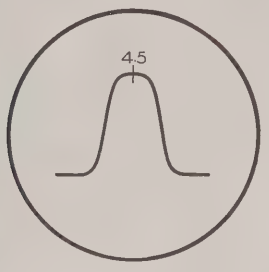


FIG. 4

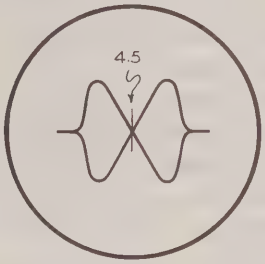
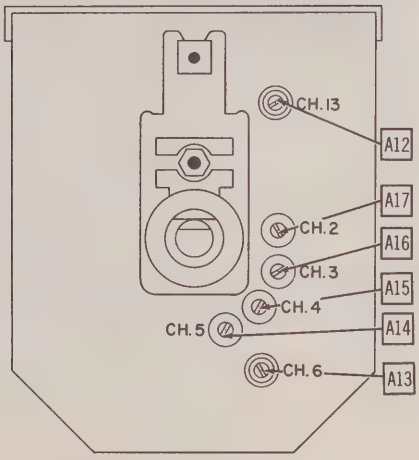


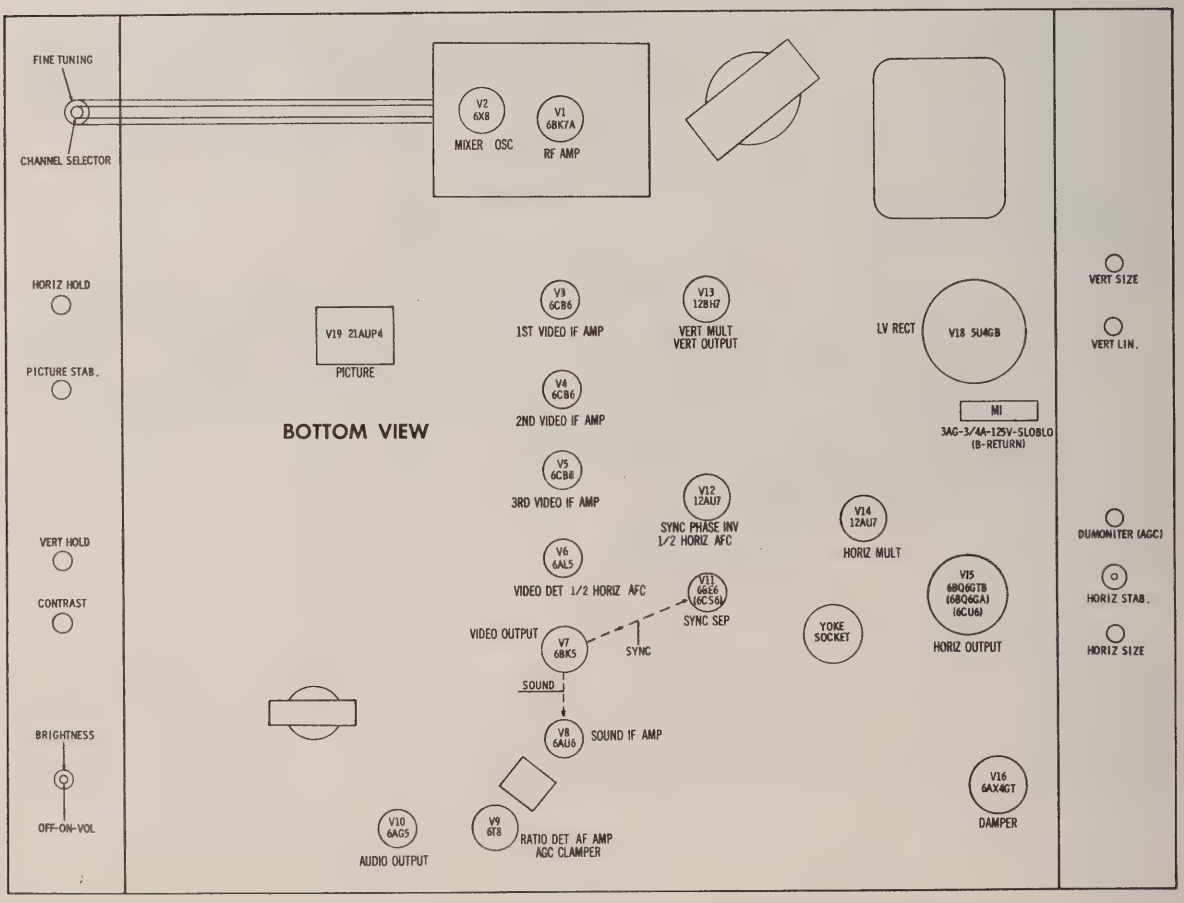
FIG. 5



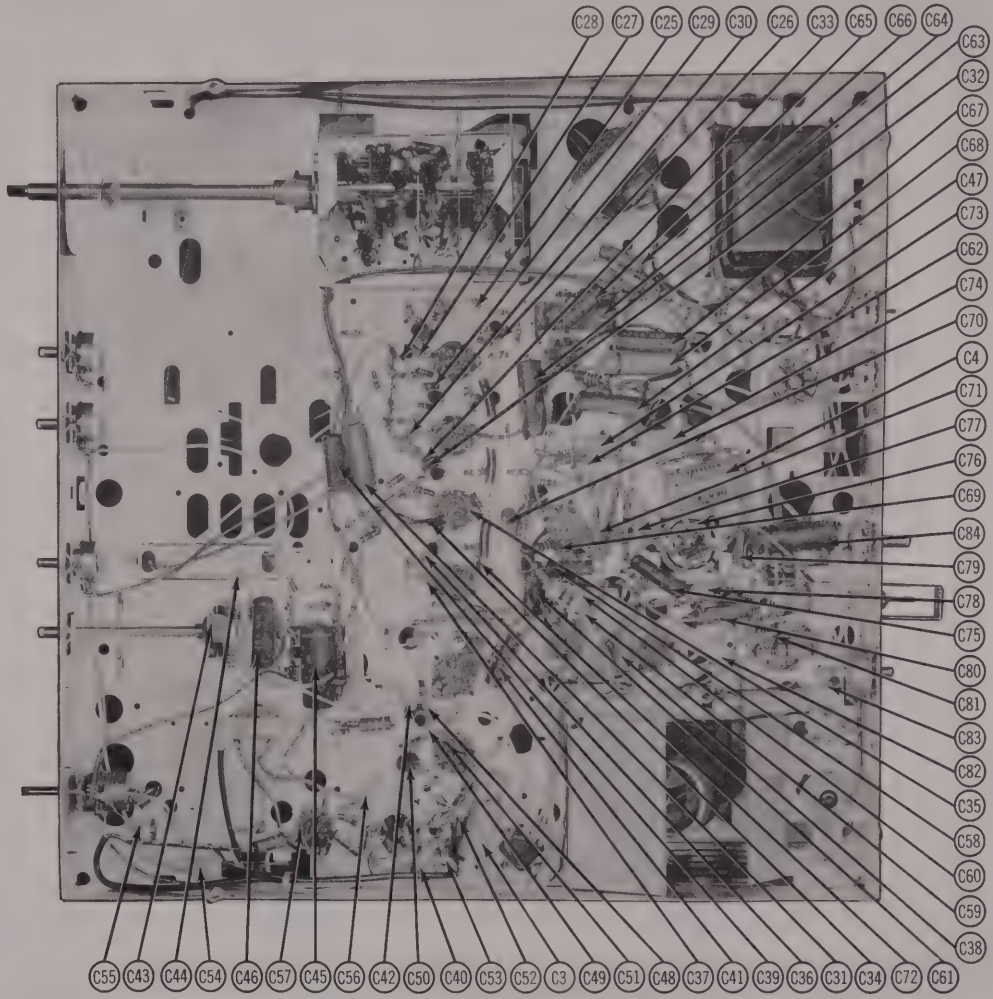
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	INF	1.1Meg	0Ω	0Ω	.1Ω	† 12KΩ	350KΩ	INF	0Ω
V 2	6X8	0Ω	22KΩ	† 6.2KΩ	.1Ω	0Ω	0Ω	100KΩ	† 120KΩ	† 20KΩ
V 3	6CB6	1.1Meg	47Ω	.1Ω	0Ω	† 2.2KΩ	† 2.2KΩ	0Ω		
V 4	6CB6	1.1Meg	68Ω	.1Ω	0Ω	† 2.2KΩ	† 47KΩ	0Ω		
V 5	6CB6	.1Ω	180Ω	.1Ω	0Ω	† 2.2KΩ	† 2.2KΩ	0Ω		
V 6	6AL5	.1Ω	10KΩ	.1Ω	0Ω	4.8Meg	0Ω	2.7KΩ		
V 7	6BK5	† 5KΩ	NC	2.7KΩ	.1Ω	0Ω	27Ω	2.7KΩ	† 5.6KΩ	NC
V 8	6AU6	1.7Ω	0Ω	0Ω	.1Ω	† 30KΩ	† 30KΩ	220Ω		
V 9	6T8	INF	33KΩ	INF	.1Ω	0Ω	1.1Meg	0Ω	10Meg	† 470KΩ
V 10	6AQ5	470KΩ	220Ω	0Ω	.1Ω	† 1.1KΩ	† 700Ω	470KΩ		
V 11	6BE6	30KΩ	0Ω	.1Ω	0Ω	† 40KΩ	† 25KΩ	1.8Meg		
V 12	12AU7	4.8Meg	4.8Meg	10KΩ	.1Ω	.1Ω	† 7.5KΩ	470KΩ	2.5KΩ	0Ω
V 13	12BH7	▲ 2.2KΩ	2.2Meg	2.8KΩ	.1Ω	.1Ω	▲ 2.5Meg	900KΩ	0Ω	0Ω
V 14	12AU7	† 100KΩ	100KΩ	2.7KΩ	.1Ω	.1Ω	† 15KΩ	5Meg	2.7KΩ	0Ω
V 15	6BQ6GTB	TP	.1Ω	NC	† 7.5KΩ	470KΩ	NC	0Ω	0Ω	TOP CAP ▲ 16Ω
V 16	6AX4GT	NC	NC	400KΩ	NC	† 40Ω	NC	.1Ω	0Ω	
V 17	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 436Ω
V 18	5U4GB	NC	40KΩ	NC	20Ω	NC	21Ω	NC	40KΩ	
V 19	21AUP4	0Ω	39KΩ	PIN 6 † 1.7KΩ	PIN 10 ▲ 120KΩ	PIN 11 † 150KΩ	PIN 12 .1Ω			

† MEASURED FROM PIN 2 OF V18.
▲ MEASURED FROM PIN 3 OF V16.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART



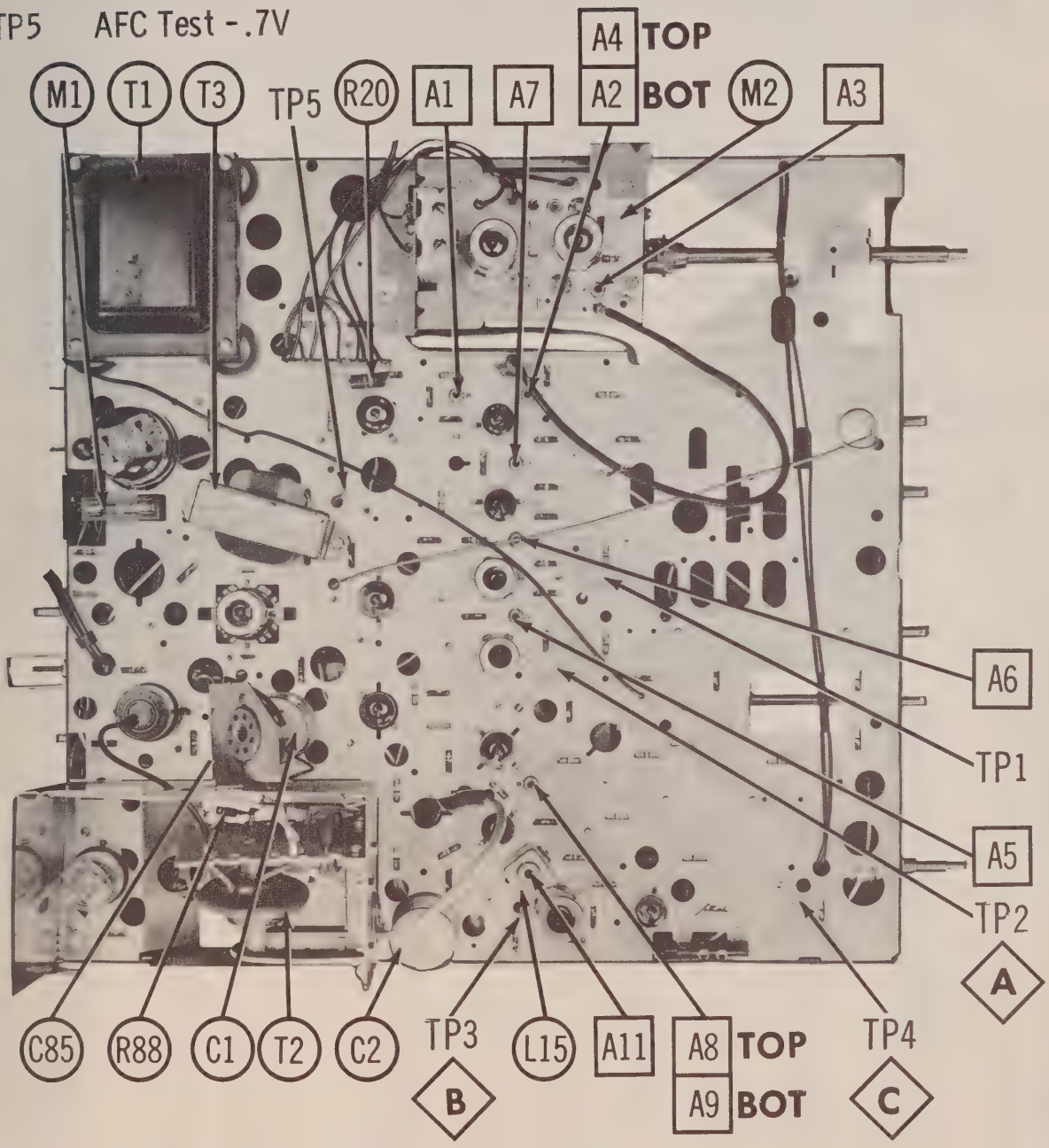
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

DUMONT
CHASSIS RA352

SET 324 FOLDER 8

PROPERTY OF

TP1 IF AGC -.3V
TP2 Video Det. Output -.1V
TP3 Ratio Det. Stabilizing -9.5V
TP4 Audio Test -8.5V
TP5 AFC Test -.7V



CHASSIS TOP VIEW

SET 324 FOLDER 8

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	6BE7A	
V2	Mixer-Oscillator	6X8	
V3	1st. Video IF Amplifier	6CB6	
V4	2nd. Video IF Amplifier	6CB6	
V5	3rd Video IF Amplifier	6CB6	
V6	Video Det. -Horiz. AFC	6AL5	
V7	Video Output	6BK5	
V8	Sound IF Amplifier	6AU6	
V9	Ratio Det.-AF Amp.- AGC Clamper	6T8	

ITEM No	USE	TYPE	NOTES
V10	Audio Output	6AQ5	
V11	Sync Separator	6BE6	
V12	Sync Phase Inv.-Horiz.AFC	12AU7	Note 1
V13	Vert Mult.-Vert Output	12BH7	
V14	Horiz Mult.	12AU7	
V15	Horiz. Output	6BQ6GTB	Note 2
V16	Damper	6AX4GT	
V17	RF Rectifier	1B3GT	
V18	LV Rectifier	5U4GB	

Note 1. 6CB6 may be used in some versions.
Note 2. 6BQ6GA-6CU6 may be used in some versions.

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	DUMONT PART No	CBS PART No	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V19	21AUP4	21AUP4A 21AUP4A/B ①	21AUP4A ① 21AUP4A/B ①	21AUP4A/ B ①	① Aluminized ② Silver screen "SS"

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA							
	CAP	VOLT	DUMONT PART No	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	NOTES
C1A	●60	350	01351427	AFH4-07	D06	FP333.8 TC32	TM-4046	Q-025	TVL-4580	
B	40	350								
C	10	50								
D	▲20	350								
C2A	●80	350	01351435	AFH4-05-50	C037	FP385.5	TM-3146	Q-087	*	R2337 *
B	●40	350		BR435	TC80	TD-4-400	TD-4-400	FM-4940		
C	4	350								
D	▲10	350								
C3	8	100	01352352	PR8150V4	BR415	TC40	TD-4-150	FM-1504	TVA-1402	
C4	30	350	01352354	PR8450V30	BR2035	TC60	TD-30-350	FM-4530	TVA-1608	

* Unit must be ordered from Mfgr.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							
	CAP.	VOLT	DUMONT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No	SPRAGUE PART No.	NOTES
C5	27				TCZ-27	TZ18	MPOL-270			
C6	4.7			MP0-4S4.7	TCZ-4R7	TZ07	MPOL-4R7	ZT-555	5TCCB-V47	
C7	27				TCZ-30	TZ17	MPOL-300			
C8	1000									
C9	1000									
C10	1-4			839-4			31S-01-10	C7951		
C11	68									
C12	91				TCZ-91	TZ39	NPO-237-91D			
C13	47		M750-D147	TCM-47	N083		M750K-470	NT-5447	5TCU-Q47	
C14	1-4			839-4			31S-01-10	C7951	5TCCB-V1	
C15	1		MP0-5S1	TCZ-1	T230		MPOA-010			
C16	3-10			839-10						
C17	27			TCM-27	N027		M750K-270			
C18	3.9									
C19	1000									
C20	100			BPD-0001	DD-101	G042	801-101	UC-521	5GA-T1	
C21	470			BPD-0047	DD-471	K060	801-471	UC-5347	5GA-T47	
C22	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C23	1000									
C24	1000									
C25	6.3		01354040							
C26	15		01351520	MP0-D15	TCZ-15	Z021	MP0K-150	ZT-5415	5TCC-Q15	
C27	100		01351900	5D100	D5-101	TP34	GP1K-101	UC-531	5GA-T1	
C28	1500		01351710	BPD-0015	DD-152	K071	501-0015	DC-5215	5HK-D15	
C29	680		01356880	5S680	D5-681	TP50	GP2K-681	UC-5368	5GA-T68	
C30	100		01351900	BPD-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C31	.15	200	01340140	P288N-15		CU32P15		PT4015	2TM-P15	
C32	1500		01353710	BPD-0015	DC-5215	K071	801-0015	DC-5215	5HK-D15	
C33	680		01356880	5S680	D5-681	TP50	GP2K-681	UC-5368	5GA-T68	
C34	680		01356880	5S680	D5-681	TP50	GP2K-681	UC-5368	5GA-T68	
C35	4700		01353740	BPD-0047	DD-472	K079	501-0047	DC-535	5HK-D47	
C36	5.1		01353180							
C37	4.7		01346750	MP0-S14.7	TCZ-4R7	TZ07	MP0A-4R7	ZT-555	5TCCB-V47	
C38	.022	200	01340320	BPD-03	DD-223	CUB3S22		PT4323	2TM-S23	
C39	.047	200	01340340	BPD-05	DF-503	CUB3S47		PT4347	2TM-S47	
C40	1000		01353700	BPD-001	DD-103	K089	501-001	DC-531	5HK-D1	
C41	.0047	600	01341040	S1470	D6-473	SUB6D47	GPS-333-472	PT6347	6TM-D47	
C42	47		01351550	MP0-S147	TCZ-47	T232	MP0-338-470	ZT-5447	5TCC-Q47	
C43	47		01351550	MP0-D147	TCZ-47	Z033	MP0-338-470	ZT-5447	5TCC-Q47	
C44	15		01353010	N750-D15	TCN-15	N021	N750K-150	NT-5415	5TCU-Q15	
C45	.22	400	01341140	P488N-22		CUB4P22		PT4322	4TM-P22	
C46	.047	400	01341090	BPD-05	DD-05	CUB4S47		PT4147	4TM-S47	
C47	.022	600	01341480	BPD-03	DD-223	CUB6S22	817-03	PT6123	6TM-S22	
C48	2.2		01352490	MP0-S12.2	TZ05	MP0A-2R2		PT4322	TCCB-V22	
C49	47		01351550	MP0-S147	TCZ-47	T232	MP0-338-470	ZT-5447	5TCC-Q47	
C50	10000		01351920	BPD-01	DD-103	K082	811-01	DC-511	5HK-E1	
C51	10000		01351690	BPD-01	DD-103	K082	811-01	DC-511	5HK-E1	
C52	680		01351900	5S680	D5-681	TP50	GP2K-681	UC-5368	5GA-T68	
C53	5000		01353750	BPD-0033	DD-333	K071	811-0033	UC-5333	5HK-D33	
C54	10000		01351920	BPD-01	DD-103	K083	811-01	DC-511	5HK-E1	
C55	4700		01353740	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C56	10000		01351920	BPD-01	DD-103	K083	811-01	DC-511	5HK-E1	
C57	4700		01353740	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C58	.0033	600	01341210	S3300	D6-332	SUB6D33	GPS-333-332	PT6333	6TM-D33	
C59	330		01351890	S330	D5-331	TP43	GP2K-331	UC-5333	5GA-T33	
C60	.1	400	01341120	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C61	.022	600	01340320	BPD-03	DD-393	CUB6S22	817-03	PT6123	6TM-S22	
C62A	2000							DC-522		
B	5000		●80006831	●PA-L10	●PC-100	●L5TMU	●1405-01	DC-525	●V-1	
C	5000							DC-525		
C63	.047	600	01341500	BPD-05	DF-503	CUB6S47		PT6147	6TM-S47	
C64	.1	600	01341890	P683N-1	DF-104	CUB6P1		PT601	6TM-P1	
C65	.0047	600	01340580	1484-0047		1R5D47		MCE465	M5-247	
C66	.0022	600	01340540	1484-0022		1R5D22			M5-222	
C67	.022	600	01340780	BPD-03	DD-303	CUB6S22	817-03	PT6123	6TM-S22	
C68	1.0	200	01340350	P388N-1	DF-104	CUB3P1		PT401	3TM-P1	
C69	1000		01358000	BPD-001	DD-103	G089	811-103	UC-531	5GA-D1	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA							
	CAP.	VOLT	DUMONT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C70	1000		01353900	DI-001	DD-102	G069	811-103	UC-531	5GA-D1	
C71	.01	600	01340390	BPD-01	DD-103	CUB6S1	GP3-333-103	PT6S1	6TM-S1	
C72	.0047	600	01353700	DI-001	DD-102	G069	811-101	UC-521	5GA-D1	
C73	.01	400	01340350	S3300	D6-332	CUB6D33	GP3-333-332	PT6333	6TM-D33	
C74	.033	200	01340330	BPD-03	DF-303	CUB3S33		PT3133	3TM-S33	
C75	.0047	500	01349680	1464-0047		1R5D47		MCE465	M5-247	
C76	33		01353030	MP0-S133	TCZ-33	TZ16	MP0K-330		5TCC-Q33	
C77	470	500	01352130	1469-00047	D6-471	SR5T47	41J-471	MCE565	M5-347	
C78	390	500	01352100	1469-00039	D6-391	SR5T39	41J-391	MCE543	M5-339	
C79	390	500	03030500	1469-00039	D6-391	SR5T39	41J-391	MCE243	M5-339	
C80	.0047	600	01341040	S1470	D6-472	CUB6D47	GPS-333-472	PT6347	6TM-D47	
C81	470		01351940	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C82	.047	400	01341090	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C83	470		01351940	S1470	D6-471	TP42	GP2K-471	UC-5347	5GA-T47	
C84	.1	600	01341540					PT601	6TM-P1	
C85	.1	200	01340120	P388M-1	DF-104	CUB3P1		PT401	3TM-P1	
C86	62	2000	02354014							

● Items C62A, C62B, C63C, R78A, R78B and R78C are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					
	RESISTANCE	WATTS	DUMONT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ	½	01356832	F1-51		● GJ-87S	UF15L	Brightness (Panel)
B	1MEG	½		1A3-83			UB15A	Volume (Rear)
C	Switch			KS-1			UB-36	Attach to R1B.
R2A	1MEG	½	01354871	A87-184		GJ3-183X		Contrast tapped at 6K & 18K
B	Shaft		Not Req.	AK-4		Not Req.		Attach to R2A.
C	Coupler		Not Req.	Not Req.		C-3		Attach to R2B.
R3A	1.5MEG	½	01356016	A87-743	A47-1.5Meg-S	GJ1-138	TA15L	Vert Hold
B	Shaft		Not Req.	AK-4	FKS-1/4	Not Req.		Attach to R3A.
R4A	3MEG	½	01356033	AB-34	A47-3Meg-S	GJ1-140	TA32L	Picture Stabilizer
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R4A.
R5A	50KΩ	½	01356032	AB-31	A47-50K-S	GJ1-133	TA54L	Horiz. Hold
B	Shaft		Not Req.	AK-4	FKS-1	Not Req.	Not Req.	Attach to R5A.
R6A	3MEG	½	01356041	BX-84	A47-3Meg-S	GJ1-140	TA32L	Vert. Size
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R6A.
R7A	500KΩ	½	01356031	BX-50	A47-500K-S	GJ1-14	TA53L	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R7A.
R8A	1MEG	½	01356033	AB-39	A47-1Meg-S	GJ1-137	TA1L	Dumontor
B	Shaft		Not Req.	AK-4	KS8-3	SQ	Not Req.	Attach to R8A.
R9A	500KΩ	½	01356803	AB-10	A47-500K-S	WP9-5000	U-14	Horiz. Size
B	Shaft		Not Req.	AK-4	FKS-1/4	Not Req.	Not Req.	Attach to R9A.

* Concentrikit Equivalent, K-8 Kit, Base Elements and Shafts; B11-138 & P17-102 (Panel)
B13-137 & R1-15 (Rear)
T6-1 (Switch)

† Universal Replacement (Mallory Exact Duplicate Part No. UE13SE2).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise stated.

ITEM No.	RATING		REPLACEMENT DATA		
	OHMS	WATT	DUMONT PART No.	IRC PART No.	NOTES
R10	10KΩ			BTS-10K	
R11	33KΩ			BTS-33K	
R12	820KΩ 5%			BTS-820K 5%	
R13	620KΩ 5%			BTS-620K 5%	
R14	100KΩ			BTS-100K	
R15	22KΩ				
R16	4700Ω			BTS-4700	
R17	4700Ω			BTS-4700	
R18	100KΩ			BTS-100K	
R19	8200Ω	1		BTA-8200	
R20	12KΩ	2	02034900	BTB-12K	
R21	2.2MEG		02033170	BTS-2.2Meg	
R22	15MEG			BTS-15Meg	
R23	220KΩ			BTS-220K	
R24	6.8MEG			BTS-6.8Meg	
R25	1.8MEG		02031260	BTS-1.8Meg	
R26	1MEG		02032150	BTS-1Meg	
R27	1MEG		02032600	BTS-1Meg	
R28	18KΩ		02031920		
R29	4700Ω		02032400	BTS-470	
R30	47Ω		02031810	BTS-47	
R31	15KΩ		02032490	BTS-15K	
R32	56MEG		03041980		
R33	470Ω		02032400	BTS-470	
R34	47KΩ	1	02034470	BTA-47K	
R35	68Ω		02031830	BTS-68	
R36	56KΩ		02031980		
R37	470Ω		02032400	BTS-470	
R38	180Ω		02031800	BTS-180	
R39	2700Ω		02031820	BTS-2700	
R40	180KΩ 5%		02031020	BTS-180K 5%	
R41	2700Ω		02031820	BTS-2700	
R42	9000Ω	10	02115370	PW10-9000	
R43	18KΩ		02031920	BTS-18K	
R44	5600Ω		02057880	BTS-5600	
R45	27Ω		02031880	BTS-27	
R46	1800Ω		02031800	BTS-1800	
R47	1000Ω		02031840	BTS-1000	
R48	100KΩ		02032540	BTS-100K	
R49	33KΩ		02032360	BTS-33K	
R50	27KΩ	1	02034940	BTA-27K	
R51	39KΩ		02031980	BTS-39K	
R52	470KΩ		02032480	BTS-470K	
R53	120KΩ		02032020	BTS-120K	
R54	27KΩ		02031940	BTS-27K	
R55	22KΩ		02031690	BTS-22K	
R56	39KΩ		02031720	BTS-39K	
R57	22KΩ		02032500	BTS-22K	
R58	33KΩ		02031950	BTS-33K	
R59	10Meg		02032660	BTS-10Meg	

ITEM No.	RATING		REPLACEMENT DATA		
	OHMS	WATT	DUMONT PART No.	IRC PART No.	NOTES
R60	470KΩ		02032580	BTS-470K	
R61	470KΩ		02032580	BTS-470K	
R63	680Ω	3	03038410	BTB-680	
R63	220Ω	1	03034690	BTA-220	
R64	33KΩ		02031950	BTS-33K	
R65	330KΩ		02032070	BTS-330K	
R66	180KΩ		02032020	BTS-180K	
R67	56KΩ		02031980	BTS-56K	
R68	68KΩ		02031990	BTS-68K	
R69	22KΩ	3	02037880	BTB-22K	
R70	470KΩ		02032090	BTS-470K	
R71	47000Ω	1	02034850	BTA-4700	
R72	100Ω		02031770	BTS-100	
R73	1500Ω		02031790	BTS-1500	
R74	100KΩ		02031770	BTS-100K	
R75	470KΩ		02032090	BTS-470K	
R76	39KΩ	1	02034960	BTA-39K	
R77	1.6MEG 5%			BTS1.6Meg 5%	Note 1
R78A	22KΩ			BTS-22K	
B	82000Ω		●80000831	BTS-8200	
C	6200Ω			BTS-8200	
R79	2.2MEG		03033630	BTS-2.2Meg	
R80	47KΩ	1	02034970	BTA-47K	
R81	47KΩ	1	02034970	BTA-47K	
R82	115KΩ 5%		02032000	BTS-115K 5%	
R83	820Ω	1	02034790	BTA-820	
R84	56ΩΩ		02041740		
R85	560Ω		02041740		
R88	100KΩ		02032010		
R87	100KΩ		02032010		
R88	100Ω		02031890		
R89	4.7MEG		02032640		
R90	680KΩ		02032019		
R91	15KΩ 5%		02032760		
R92	82KΩ		02032900		
R93	3700Ω		02032680		
R94	100KΩ		02032010		
R95	100KΩ 5%		02032960		
R96	470Ω		02032400		
R97	15KΩ 5%		02032760		
R98	68Ω		02033350		
R99	470KΩ		02032580		
R100	100Ω	1	03034770	BTA-1000	
R101	3300Ω	7	02113550	PW7-3300	
R102	1500Ω	3	02037790	BTB-1500	
R103	100KΩ		02032420		
R104	2.2Ω		02000790	BW½-2.2	
R105	1700Ω	5.5	02033300	1.5WA-1700	
R106	100KΩ	1	03046010	BTA-100K	

Note 1. Some versions use a 1.8Meg 5% ½W resistor in this application (Part #02032160).

● Items R78A, R78B, R78C, C62A, C62B, C63C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	DUMONT PART No	Halldorson PART No	Merit PART No	Stancor PART No.	Thordarson PART No	Triad PART No
T1	117VAC @ 1.5A	520VCT @ .390A	6.3V @ 3A	6.3V @ 1.8A	20010141		P-8330 ③ .6	P-8334 ④ 5	25S33 ⑤ 7	R-51BC ⑥ 3

① Tape 5V @ 3A winding.
② Parallel and phase 6.3V @ 5A windings.
③ Parallel and phase 6.3V @ 6A windings.
④ Tape 8.2V @ 1.25A winding.
⑤ Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							
		DUMONT PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T3	Horiz. Output Trans.	20009391	PB419 *	HVO-38 *	2327: *	X094 *	A-8254 *①	FLY-38 *	D-35 *
T4	Vert. Output Trans.	20009322	21816	A-3239	2327:	V312	A-8141	26S54	A-104X
T4A	Yoke-Horiz. (36MEI)	21013281	DF805 ②⑤	MDF-75 ⑤	2322: ⑤	Y70F25 ⑤	DY-15A ⑤	Y-18 ③ ⑤	T-19-1 ③ ⑤
B	Vert. (36MEI)	89013574 ⑤ 29000771 ⑤							

① Drill new mounting hole(s).
② Alternate Dumont part number.
③ Yoke rear cover and centering device.
④ Use original rear cover and centering device.
⑤ Connect horizontal damping network across terminals #3 and #7. Use original if necessary.
⑥ Use original horizontal yoke damping network if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connection	Merit Replacement Connection	RCA Replacement Connection	Ram Replacement Connection	Stancor Replacement Connection	Thordarson Replacement Connection	Triad Replacement Connection
9	9	9	10	9	5	3	10
2	5	5	9	5	4	Jumper 2 & 10	Jumper 9 & 7
1	1	1	3		3	4	3
7	6	6	2	3	2	AFC Winding 2	2
5	2	2	1	6	1	AFC Winding 1	1
Special Note: ⑦							

⑦ If the picture is out of phase, reverse AFC winding.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					
	PRI.	SEC.	DUMONT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6.5KΩ	3-4Ω	20010161	Z1004	A2930	A3877	24S48	S-6X	1 Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS				REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.		DUMONT PART No	QUAM PART No	RCA TYPE No	
SP1	4"	PM	3-4Ω		18003791	AA07	2335	

COILS (RF-IF)

ITEM No.	USE	DC RES		REPLACEMENT DATA				NOTES
		PRI.	SEC.	DUMONT PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	
L1	41.25MC Trap	.1Ω		21014201				
L2	1st Video IF	.1Ω		20009851				Tapped
L3	Fil. Choke	0Ω		21011762	19-1001		4604	
L4	2nd Video IF	.1Ω	.1Ω	20008991	17-4524	TV-130	6219	
L5	Fil. Choke	0Ω		21011762	19-1001		4604	
L6	3rd Video IF	.1Ω	.1Ω	20008991	17-4522	TV-130	6219	
L7	Fil. Choke	0Ω		21011762	19-1001		4604	
L8	4th Video IF	.1Ω	.1Ω	20008991	17-4524	TV-130	6219	
L9	Series Peaking Coil	4.6Ω		21012451			4626	27 Microhenries
L10	Shunt Peaking Coil	10Ω		21006828	19-4201	TV-184	8154	187 Microhenries
L11	Series Peaking Coil	6.5Ω		21006822	19-3100	TV-181	6177	110 Microhenries
L12A	4.5MC Trap	2Ω						
B	Shunt IF	1.7Ω		21013871				
L13	Shunt Peaking Coil	6.8Ω		21006822	19-3100	TV-181	6177	110 Microhenries
L14	Series Peaking Coil	9Ω		21013861	19-3160		6120	153 Microhenries
L15	Ratio Det.	5.2Ω	.8ΩCT	20009043	19-3497 *	TV-115 *	6305 *	Tertiary Windings: T2 & 3 Microhenries; IRC Part No. C1-1
L16	RF Choke	6.1Ω		21006550	19-1003		4608	4.7 Microhenries; IRC Part No. C1-1
L17	RF Choke	2.8Ω		21006520	19-1005		4612	

* Use adaptor plate.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DUMONT PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	RCA TYPE No	Ram PART No	Thordarson PART No
L18	53Ω		21010992	19-1576	TV-163	6210			HS-5

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D C RESISTANCE	INDUCTANCE @ CURRENT 1000 Cy	DUMONT PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
L19	250A	2Ω, 5Ω	L 19HY	21010955	C5037	C2966	C2326 ①	28C44 ①	C-17X

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

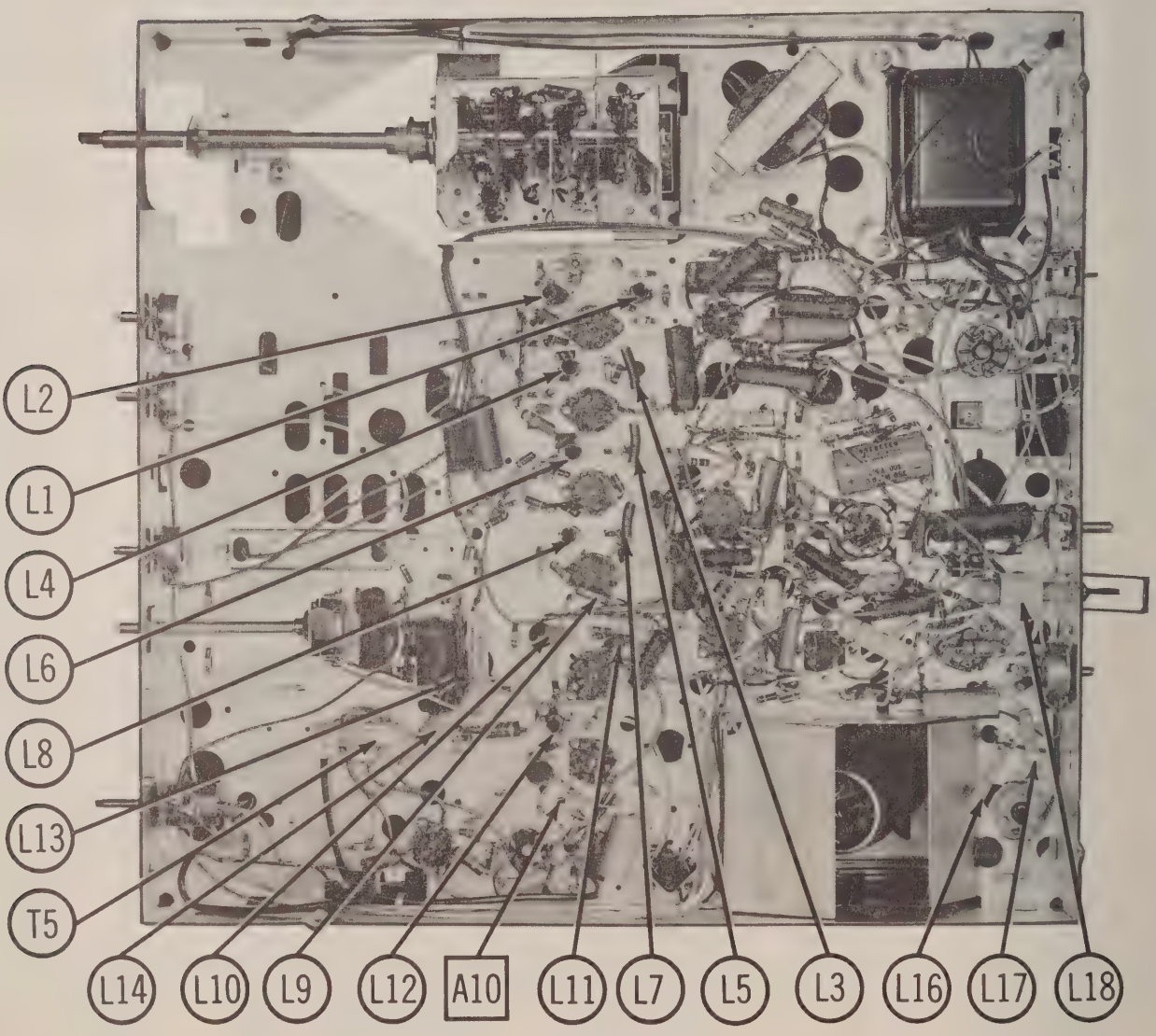
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			DUMONT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	3/4A 250V	11005230	13110001	313. 750 (3AG S/B 3/4A)	357001	MDL 3/4	4405

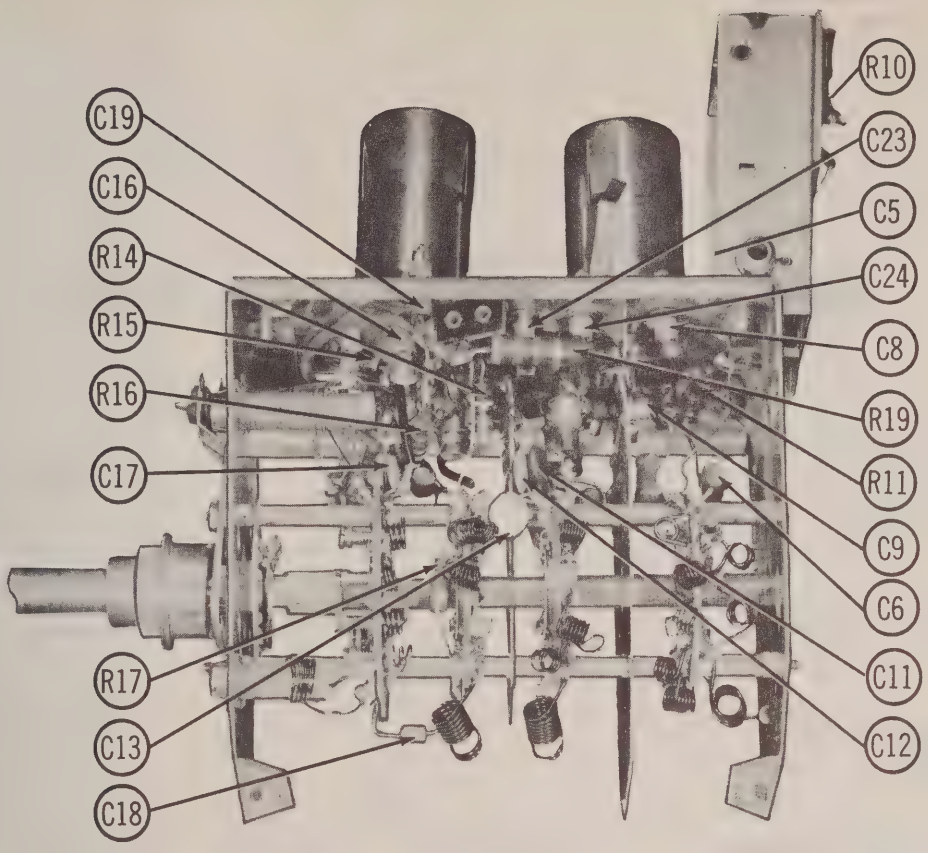
MISCELLANEOUS

ITEM No.	PART NAME	DUMONT PART No.	NOTES
M2	Tuner	89013753 *	VHF
M3	Centering Device	29000771	Includes deflection yoke (T4) Rear cover
M4	Ion Trap	29000663	

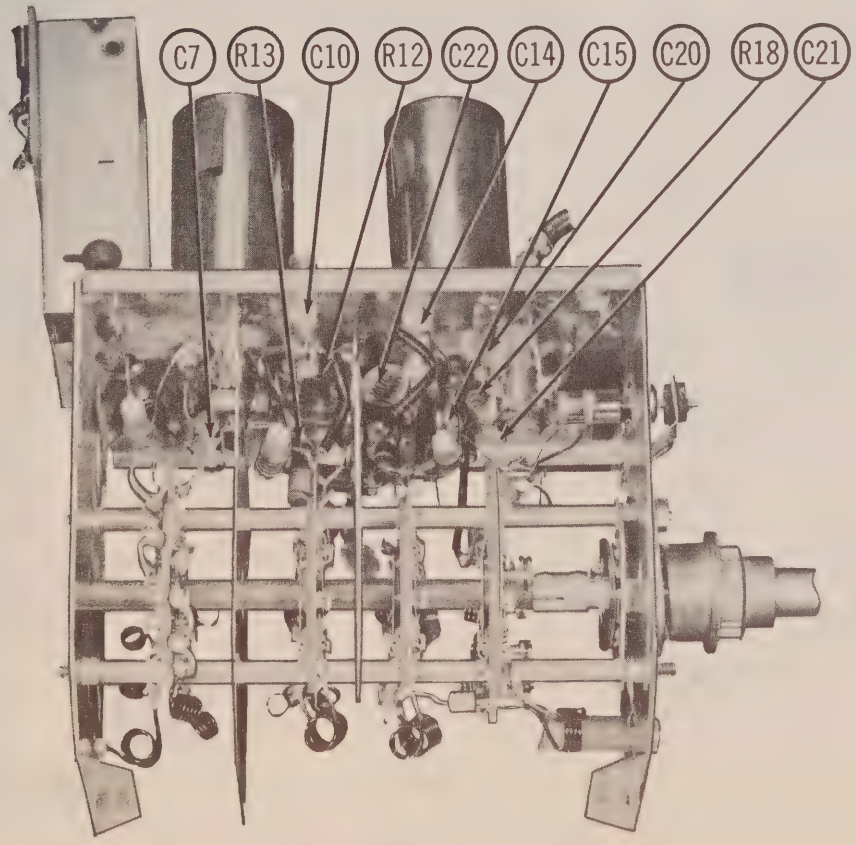
* Alternate Part No. 89013554.



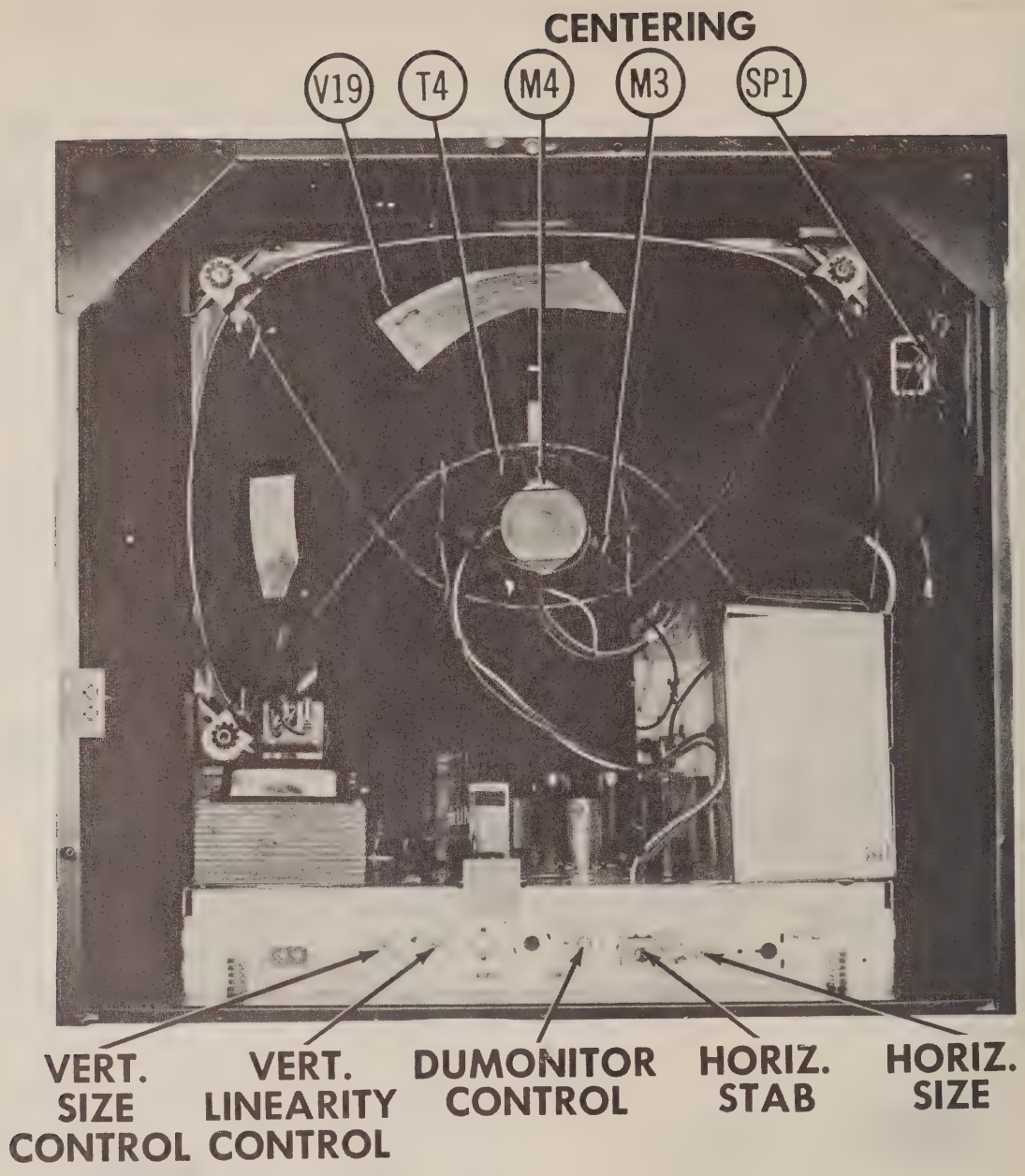
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



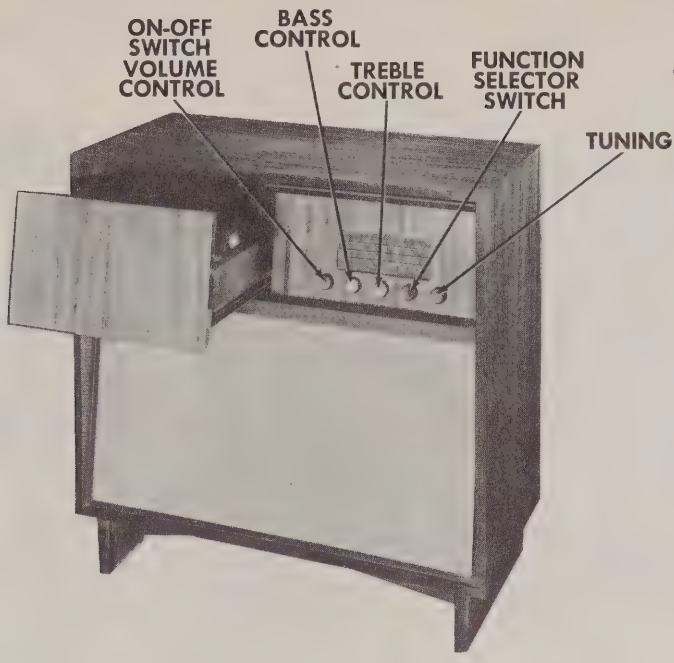
CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.
2. Set the horizontal hold control to its mid-range position.
3. Adjust the horizontal stabilizer slug (B1) to the center of its range, then momentarily remove signal by switching off channel and back again. Picture should pull into sync. If not, readjust B1 slightly until the picture pulls into sync.
4. Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.

FIRESTONE MODELS 4-A-147, 4-A-148 (Code 1-5-10XF4)

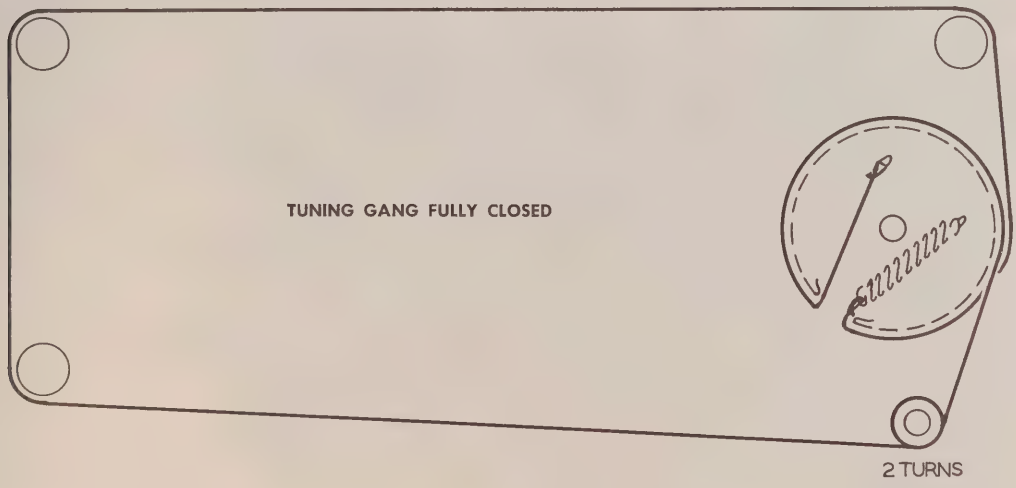
PROPERTY OF
L. F. BLANKENSHIP
3324 MEADE ST
DENVER, COLORADO



FIRESTONE MODELS 4-A-147, 4-A-148 (Code 1-5-10XF4)

TRADE NAME	Firestone Models 4-A-147, 4-A-148 (Code 1-5-10XF4)	
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio	
TYPE SET	AC Operated AM-FM-Phono Combination Superheterodyne Receiver	
TUBES	Eleven	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING .70 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1650KC	FREQ. MOD. 88-108MC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT - SEE SIMILAR V-M MODEL 950 - PHOTOFACT SET 216 - FOLDER 11 OR RECORD CHANGER MANUAL CM-5.



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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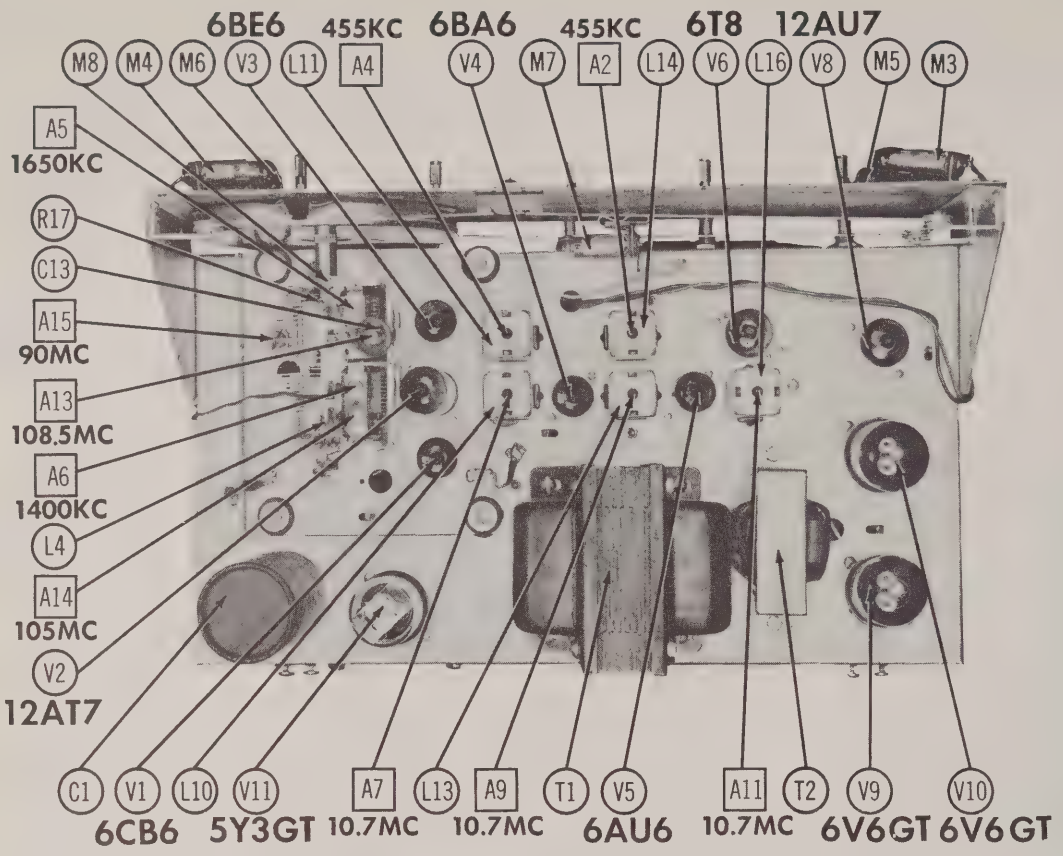
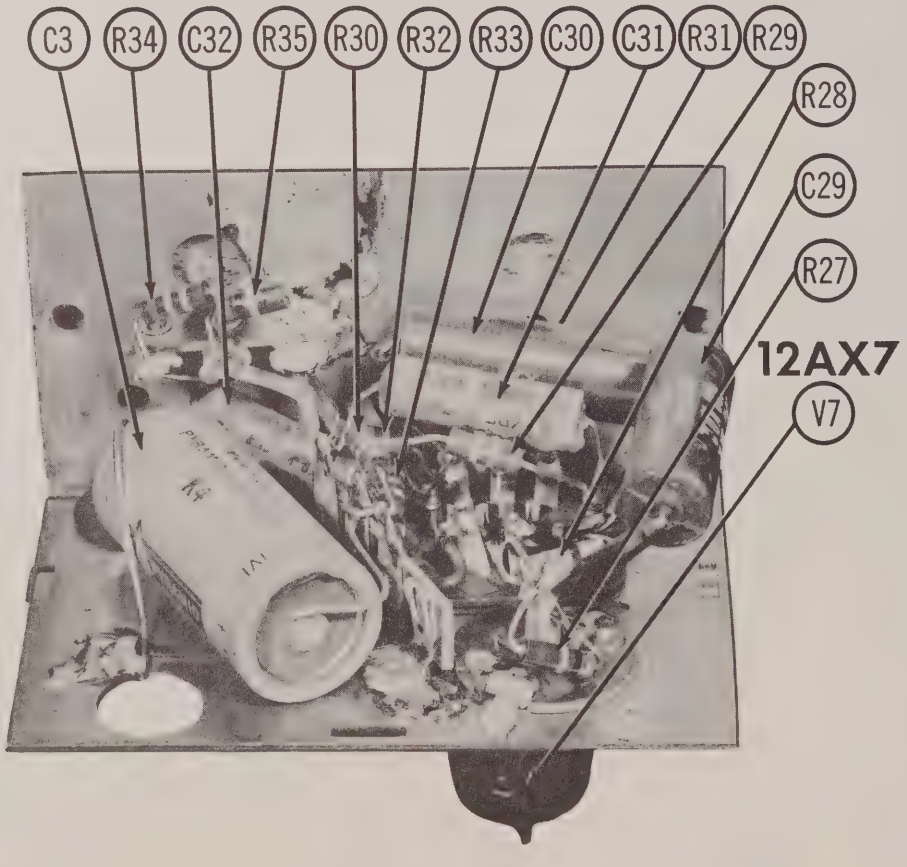
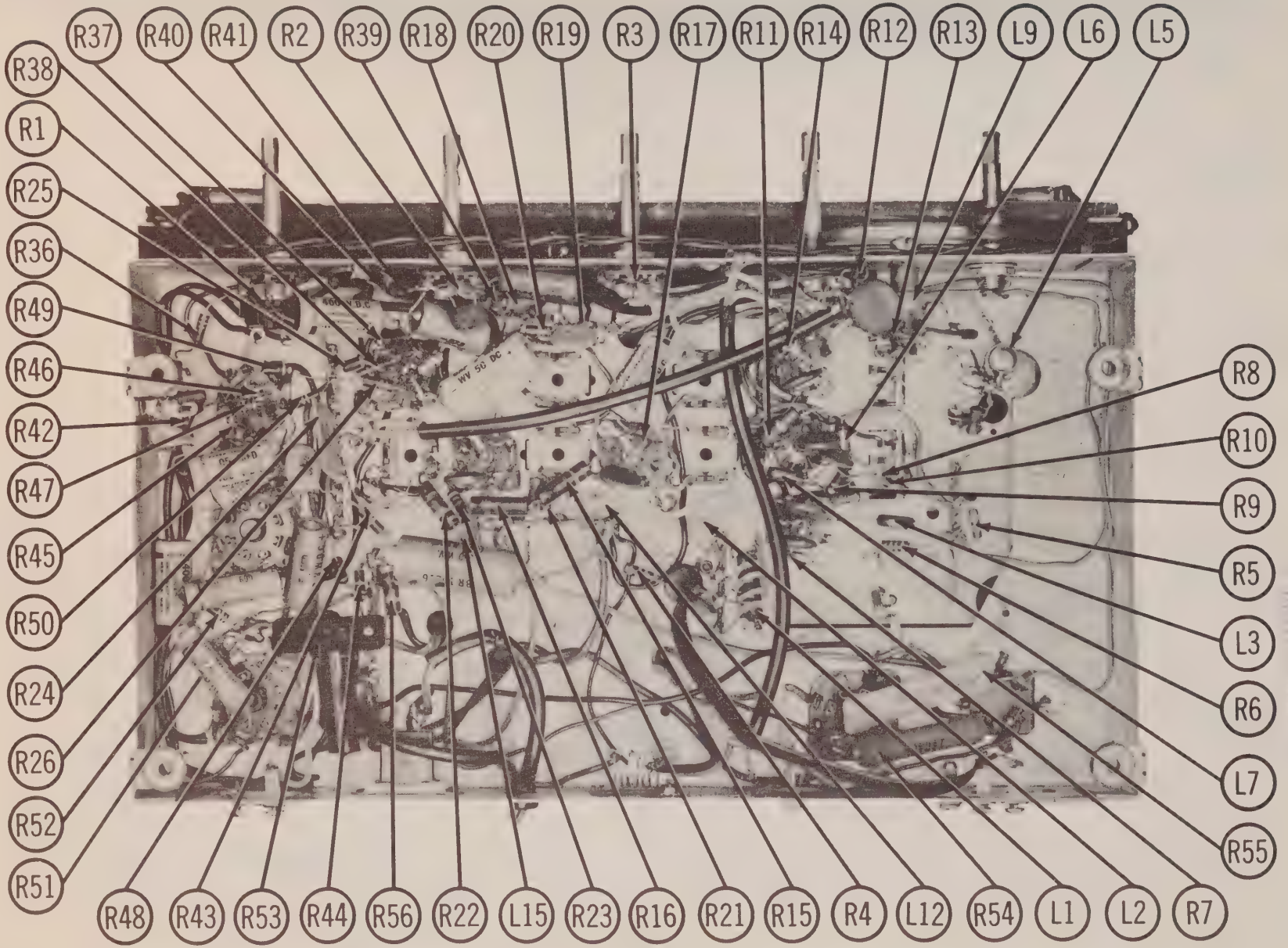


CHASSIS TOP VIEW

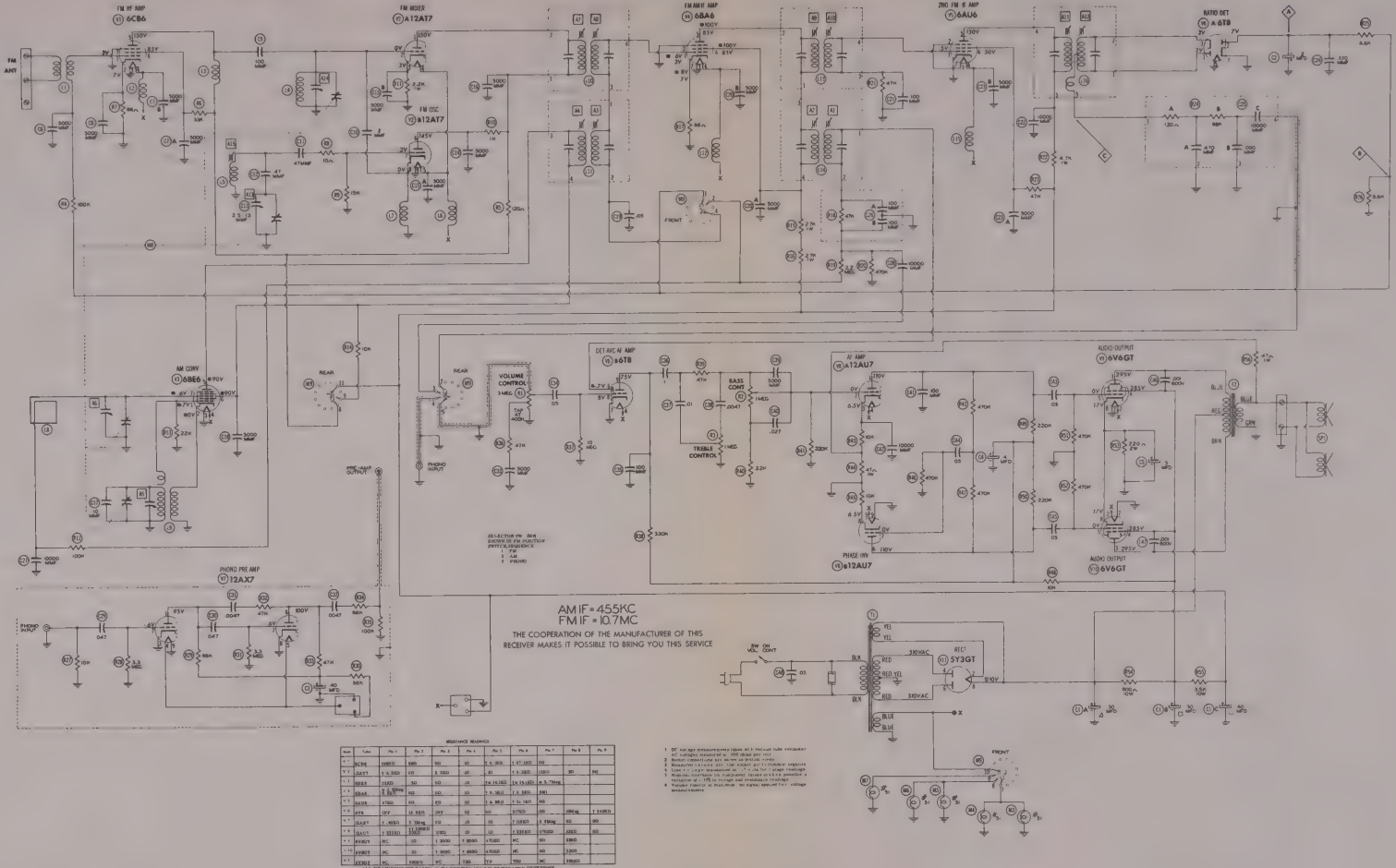


CHASSIS-PHONO PREAMP.



CHASSIS-BOTTOM VIEW-RESISTOR IDENTIFICATION

FIRESTONE
MODEL 4-A-147


FM RF AMP V1 6CB6
FM MIXER V2 A12AT7
FM OSC V3 12AT7
FM AMP V4 6BA6
2ND FM IF AMP V5 6AU6
RATIO DET V6 6T8
AM CONV V7 6BE6
IMP. AMP OUTPUT
PHONO PRE AMP V7 12AX7
DET AVC AF AMP V8 6T8
AF AMP V9 12AU7
PHASE INV V9 12AU7
AUDIO OUTPUT V10 6V6GT
AUDIO OUTPUT V10 6V6GT
RECT V11 5Y3GT
VOLUME CONTROL
BASS CONT
TREBLE CONTROL
PHONO INPUT
REAR
FRONT
AM IF = 455KC
FM IF = 10.7MC
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CB6	180Ω	880	0Ω	0Ω	0Ω	1 K 180Ω	1 K 180Ω	0Ω	
V2	12AT7	1 K 260Ω	0Ω	0Ω	3.28Ω	0Ω	1 K 260Ω	1 K 260Ω	0Ω	0Ω
V3	12AT7	21KΩ	3KΩ	0Ω	0Ω	0Ω	24K 140Ω	24K 140Ω	0Ω	0Ω
V4	6BA6	0Ω	0Ω	0Ω	0Ω	0Ω	1 K 180Ω	1 K 180Ω	0Ω	
V5	6AU6	470Ω	0Ω	0Ω	0Ω	0Ω	1 K 180Ω	1 K 180Ω	0Ω	
V6	6T8	OPEN	13.4KΩ	2K7	0Ω	0Ω	470Ω	0Ω	28K	2.5MEG
V7	6BE6	1 .4MEG	3.78K	0Ω	0Ω	0Ω	1 330Ω	3.78K	0Ω	0Ω
V7	12AX7	1 330Ω	1.2MEG	0MEG	0Ω	0Ω	1 330Ω	470Ω	0MEG	0Ω
V8	6T8	NC	0Ω	1 300Ω	1 80Ω	470Ω	NC	0Ω	330Ω	
V9	12AU7	NC	0Ω	1 300Ω	1 600Ω	470Ω	NC	0Ω	330Ω	
V10	6V6GT	NC	300Ω	NC	0Ω	0Ω	0Ω	NC	390Ω	

MEASUREMENTS TAKEN IN FM POSITION UNLESS DESIGNATED OTHERWISE.
* MEASURED FROM PIN 8 OF V4.
** MEASURED IN AM POSITION.
*** BASS CONTROL SET AT MAXIMUM CLOCKWISE POSITION.
NC-NO CONNECTION.
TP-TP POINT

1 DC voltage measurements taken with 20,000 ohm per volt DC voltmeter and voltages measured to chassis unless otherwise noted.
2 Resistance measurements taken with power off.
3 Line voltage adjusted to 117 volts AC for all voltage readings.
4 Readings may vary as much as 15% due to voltage readings.
5 Readings may vary as much as 15% due to voltage readings.
6 Values listed are maximum. All ranges allowed for voltage fluctuations.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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324-9

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Set tone control at treble position.
Tuning gang fully open and set pointer 1¼" from right hand edge of dial backplate.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	455KC (400∿Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1650KC	"	"	"	A5	"
3.		Loop	1400KC	"	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.1MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (Unmod)	FM	Tuning gang fully open	DC probe to point Ⓐ. Common to chassis.	A7, A8, A9, A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
5.	"	"	"	"	"	DC probe thru 1Meg to point Ⓑ. Common to point Ⓒ.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.1MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (Unmod)	FM	Tuning gang fully open	Vert. Amp. to point Ⓐ. Low side to chassis.	A7, A8, A9, A10, A11	Disconnect stabilizer capacitor (C2). Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. thru 1Meg to point Ⓑ. Low side to chassis.	A12	Reconnect capacitor (C2). Adjust A12 so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A11 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

* Adjustments necessary only for proper tracking or to cover FM range.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	270Ω Carbon Resistors	High side to FM antenna terminal. Low side to chassis.	108.5MC (Unmod)	FM	Tuning gang fully open	DC probe to point Ⓐ. Common to chassis.	A13	Adjust for maximum deflection.
7.	"	"	105MC	"	Tune to 105MC signal	"	A14	"
8.	"	"	87.5MC	"	Tuning gang fully closed	"	L4*	Compress or expand L3 for maximum deflection.
9.	"	"	108.5MC	"	Tuning gang fully open	"	A13 *	Adjust for maximum deflection.
10.	"	"	90MC	"	Tune to 90MC signal	"	A15 *	"

FIG. 1

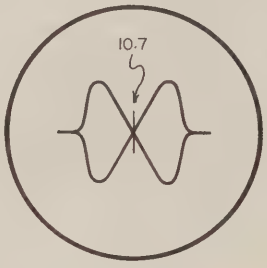


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT	
V1	FM RF Amplifier	6CB6	6CB6	
V2	FM Mixer - Osc.	12AT7	12AT7	
V3	AM Converter	6BE6	6BE6	
V4	FM - AM IF Amplifier	6BA6	6BA6	
V5	FM IF Amplifier	6AU6	6AU6	
V6	Ratio Det -			
	AM Det. - AVC-AF Amplifier	6T8	6T8	
V7	Phono Preamplifier	12AX7	12AX7	
V8	AF Amplifier -			
	Phase Inverter	12AU7	12AU7	
V9	Output	6V6GT	6V6GT	
V10	Output	6V6GT	6V6GT	
V11	Rectifier	5Y3GT	5Y3GT	

ELECTROLYTIC CAPACITORS

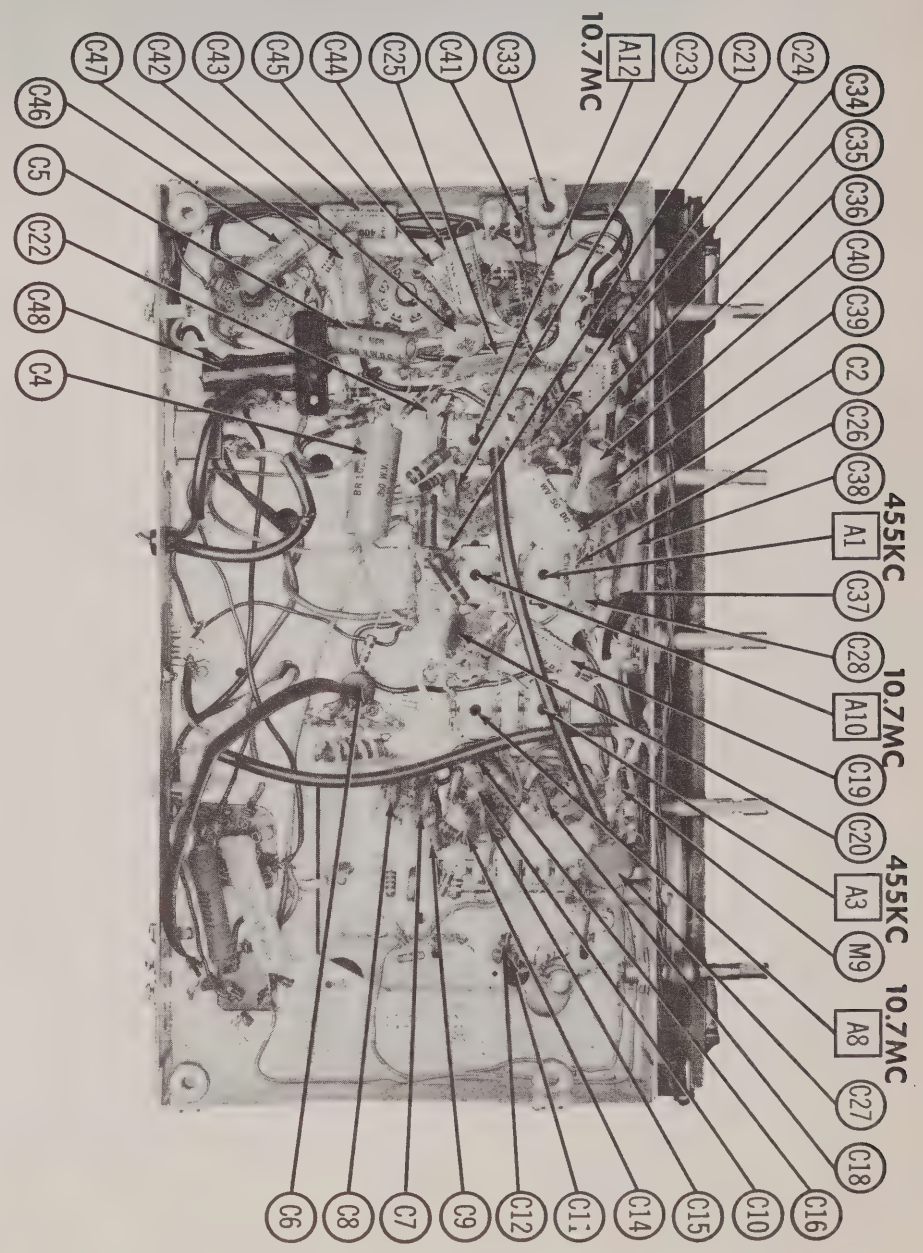
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲30	450		AFH3-44	C156	FP396.14	TM-T40-450	T-170	TVL-3787
B	■30	450							
C	▬40	450							
C2	2	50		PRS50V2	BBR2-50	TC302	TD-2-50	MMT-0505	TVA-1301
C3	40	150		PRS150V40	BR4015	TC48	TD-40-150	FM-1540	TVA-1413
C4	4	350		PRS350V4	BR435	TC60	TD-4-450	FM-4504	TVA-1601
C5	5	50		PRS150V4	BR550	TC30	TD-5-50	MMT-0505	TVA-1303

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C7A	5000			BPD-2X0047	DD2-502	DK079	811-005	DC525	5HK-2D47	
B	5000						811-005	DC525		
C8	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C9	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C10	2			NPO-SI22	TCZ-2R2	TZ05	NPOA-2R2		5TCCB-V22	
C11	47			SI47	D6-470	TP29	GP1K-470	UC-5347	5GA-Q47	
C12	47			SI47	D6-470	TP29	GP1K-470	UC-5347	5GA-Q47	
C13	2.5-13				822-BZ					
C14	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C15A	5000			BPD-2X0047	DD2-502	DK079	811-005	DC525	5HK-2D47	
B	5000						811-005	DC525		
C16	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C17	10			NPO-SI10	TCZ-10	TZ09	NPOA-100	ZT-541	5TCC-Q1	
C18	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C19	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C20A	5000			BPD-2X0047	DD2-502	DK079	811-005	DC525	5HK-2D47	
B	5000						811-005	DC525		
C21	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C22	10000			BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C23A	5000			BPD-2X0047	DD2-502	DK079	811-005	DC525	5HK-2D47	
B	5000						811-005	DC525		
C24	330			SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C25A	470			SI470	♦PC-225	TP46	811-471	UC-5347	5GA-T47	
B	1000			SI1000		TP52	801-001	DC521	5HK-D1	
C	10000			BPD-01		K082	811-01	DC511	5HK-S1	
C26A	100		† PA-97-1	† PC-50	† 111TM1	† 1403-01	UC-531	† D-1		
B	100						UC531			
C27	10000			BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C28	10000			BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C29	.047	400		BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C30	.047	400		BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C31	.0047	400		SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C32	.0047	400		SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C33	5000			BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C34	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C35	100			NPO-SI100	D6-101	5R5T1	801-101	ZT-531	5TCC-T1	

CHASSIS BOTTOM VIEW CAPACITORS IDENT.



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C36	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C37	.01	200		BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C38	.0047	400		S14700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C39	5000			BPD-005	DD-502	K082	811-005	DC525	5HK-D5	
C40	.027	400								
C41	100			S1100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C42	10000			BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C43	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C44	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C45	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C46	.001	600		S11000	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C47	.001	600		S11000	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C48	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	

♦Items C25A, C25B, C25C, R24A, and R24B are combined in one unit.
† Items C26A, C26B, and R18 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FIRESTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3Meg	½	VC-67	ABT-8515	A47F-3Meg		UT-457	Volume-Tapped at 400KΩ
B	Shaft		Not Req.	AK-4	KSS-3		Not Req.	Attach to R1A
C	Switch		Not Req.	KB-1	SWE-12		US-26	Attach to R1A
R2A	1Meg	½	VC-66	AB-69	A47-1Meg-S	Q11-137	U-54	Bass
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A
R3A	1Meg	½	VC-66	AB-69	A47-1Meg-S	Q11-137	U-54	Treble
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R4	100KΩ	½		BTS-100K	
R5	120Ω	½		BTS-120	
R6	33KΩ	½		BTS-33K	
R7	68Ω	½		BTS-68	
R8	10Ω	½		BTS-10	
R9	15KΩ 5%	½		BTS-15K 5%	
R10	1000Ω	½		BTS-1000	
R11	2200Ω	1		BTA-2200	
R12	100KΩ	½		BTS-100K	
R13	22KΩ	½		BTS-22K	
R14	10KΩ	½		BTS-10K	
R15	2700Ω	1		BTA-2700	
R16	2700Ω	1		BTA-2700	
R17	68Ω	½		BTS-68	
R18	47KΩ		†	BTS-47K	
R19	2.2Meg	½		BTS-2.2Meg	
R20	470KΩ	½		BTS-470K	
R21	47KΩ	½		BTS-47K	
R22	4700Ω	1		BTA-4700	
R23	47KΩ	½		BTS-47K	
R24A	120Ω		♦	BTS-120	
B	68KΩ			BTS-68K	
R25	6800Ω	½		BTS-6800	
R26	6800Ω	½		BTS-6800	
R27	10KΩ	½		BTS-10K	
R28	3.3Meg	½		BTS-3.3Meg	
R29	68K	½		BTS-68K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R30	68K	½		BTS-68K	
R31	3.3Meg	½		BTS-3.3Meg	
R32	47KΩ	½		BTS-47K	
R33	47KΩ	½		BTS-47K	
R34	68KΩ	½		BTS-68K	
R35	100KΩ	½		BTS-100K	
R36	47KΩ 5%	½		BTS-47K 5%	
R37	10Meg	½		BTS-10Meg	
R38	330KΩ 5%	½		BTS-330K	
R39	47KΩ	½		BTS-47K	
R40	22KΩ 5%	½		BTS-22K 5%	
R41	220KΩ 5%	½		BTS-220K 5%	
R42	470KΩ	½		BTS-470K	
R43	10KΩ	½		BTS-10K	
R44	47Ω	1		BTA-47	
R45	10KΩ	½		BTS-10K	
R46	470KΩ	½		BTS-470K	
R47	470KΩ	½		BTS-470K	
R48	10KΩ	½		BTS-10K	
R49	220KΩ 5%	½		BTS-220K	
R50	220KΩ	½		BTS-220K	
R51	470KΩ	½		BTS-470K	
R52	470KΩ	½		BTS-470K	
R53	220Ω	2		BTB-220	
R54	600Ω	10		1 3/4A-600	
R55	3500Ω	10		1 3/4A-3500	
R56	47Ω	1		BTA-47	

† Items C26A, C26B, R18 are combined in one unit.
♦Items C25A, C25B, C25C, R24A, R24B are combined in one unit.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.7A	600VCT .082ADC	5VAC @ 2A	6.3VAC @2.6A		P9312			22R04 ①	

① Used Universal mounting brackets.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	7.2KΩ	11.2Ω		Z1011	A-2904 ①	A-3870	26846 ①	S-55X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA FIRESTONE PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	12"	PM	11.2Ω		12A6C0		Coaxial type speaker

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Trans.	0Ω	0Ω					
L2	Fil. Choke	0Ω			19-1001		4604	1.4 Microhenries
L3	RF Coil	.2Ω			19-1002		4606	2.7 Microhenries
L4	FM RF Coil	0Ω						
L5	FM Osc. Coil	0Ω						
L6	Fil. Choke	.5Ω			19-1004		4610	5.8 Microhenries
L7	Cathode Choke	.2Ω			19-1002		4606	2.7 Microhenries
L8	AM Loop Ant.	1.3Ω						
L9	AM Osc. Coil	.7Ω	5.5Ω		14-1073 *		69-OSC ■	
L10	1st. FM IF	.7Ω	.7Ω	LF-58	16-3487	FM-254	1463	
L11	1st. AM IF	15Ω	15Ω	LF-54	16-6758	BC-352	12-C1	
L12	Fil. Choke	0Ω			19-1001		4604	1.4 Microhenries
L13	2nd. FM IF	.7Ω	.7Ω	LF-52	16-3487	FM-254	1463	
L14	2nd. AM IF	10Ω	10Ω	LF-59	16-6758	BC-353	12-C2	
L15	Fil. Choke	0Ω			19-1001		4604	1.4 Microhenries
L16	Ratio Detector	1.6Ω	.9ΩCT	LF-53	17-3488 ▲	FM-255	1465	Tertiary winding -.4Ω

* Leads sufficient mounting support.
■ Drill new mounting hole.
▲ Enlarge chassis hole and drill mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA FIRESTONE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1						

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA FIRESTONE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		†G-13 or ♦†G-13SD or ♦G-13D	†AC-410 or ♦†AC-410DI or ♦AC-410D	†W-68TPS or ♦†W-68DS or ♦W-68TPD	†Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M3	Dial Light		#51 - FM Dial
M4	Dial Light		#51 - FM Dial
M5	Dial Light		#51 - AM Dial
M6	Dial Light		#51 - AM Dial
M7	Dial Light		#51 - Phono position
M8	Tuning Cap.	CV-66	4 Gang (AM Sections: 32-500MMF, 21-185MMF)
M9	Switch		Selector (Rotary-wafer type)

PROPERTY OF
E. C. FLANNENSHIP
3301 MEADE ST.
DENVER, COLORADO

MOTOROLA MODELS
56RF1, 56RF2 (Ch. HS-497)

MOTOROLA MODELS
56RF1, 56RF2 (Ch. HS-497)

TRADE NAME	Motorola Models 56RF1, 56RF2 (Ch. HS-497)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Ill.
TYPE SET	AC Operated AM Superheterodyne Receiver with 3 Speed Manual Record Player
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis (outer edges).	455KC (400∿ Mod.)	Tuning gang fully open	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1620KC	"	"	A5	"

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det. -AVC-AF Amp.	12AV6	
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■ 50	150	23B632015	AFH2-15	B015	FP213	TMD12	D-065	TVL-2432
B	▲ 30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.05	200	8B120842	BPD-05				PTS415	2SE-47	
C3	4700		21R120149	BPD-0047	DD-472	K079		DC525	5HK-D47	
C4	2000		21R121106	BPD-002	DD-202	K072		DC522	5HK-D2	
C5A	220									
B	5000									
C	5000		♦ 21B630180	♦ PA-299	♦ PC-158					
D	250									
E										
C6	.01	400	8K122334	BPD-01	DD-103	K082		PTS411	4SE-S10	
C7	.05	400	8K121268	BPD-05				PTS415	4SE-S47	

♦ Items C5A, C5B, C5C, C5D, C5E, R9A, R9B and R9C are combined in one unit. When replacing items separately, C5D and C5E should total 250MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1Meg *	½	18B634649					Volume & Switch
R2	1Meg	½	18B634577					Tone & Switch

* Tap @ 300KΩ.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	NOTES
R3	22KΩ		6R6028	BTS-22K	
R4	3.3Meg		6R2118	BTS-3.3Meg	
R5	100Ω		6R6018	BTS-100	
R6	3.3Meg		6R2118	BTS-3.3Meg	
R7	39KΩ		6R6487	BTS-39K	
R8	39KΩ		6R6487	BTS-39K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	NOTES
R9A	6.8Meg			BTS-6.8Meg	
B	470KΩ		♦ 21B630180	BTS-470K	
C	470KΩ			BTS-470K	
R10	150Ω		6R3992	BTS-150	
R11	1000Ω	1	6B119404	BTA-1000	
R12	27Ω		6R5683	BTS-27	

♦ Items R9A, R9B, R9C, C5A, C5B, C5C, C5D, C5E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.5KΩ	3-4Ω	25B633669-0	Z1101 ①	A-3025 ①	A-3332 ①		S-12X ①	① Drill one new mtg. hole.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA MOTOROLA PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	4"	PM	3-4Ω	50C634576-A	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	3.7Ω		24B634670				
L2	Osc. Coil	1Ω	13Ω	24B631990				
L3	Input IF	17Ω		24K632782				
L4	Output IF	15Ω	15Ω	24K632039				

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA MOTOROLA PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1	59C634613			47	0-1 or S-1 and 0-3	

ELECTRO VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

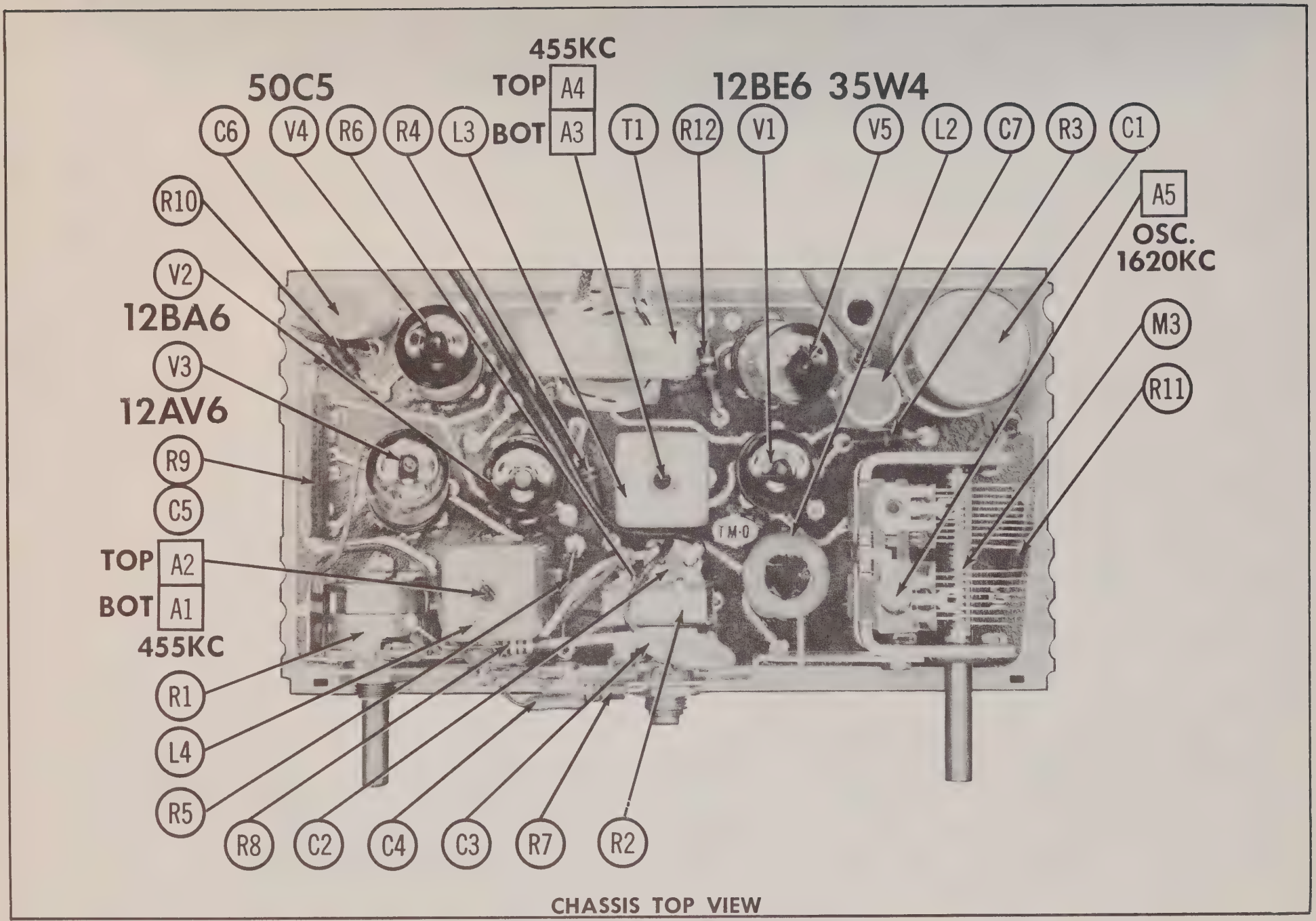
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA MOTOROLA PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2	47K632856	* JP-35 or † JPS-35 or ♦† JPS-35SD or ♦ JPS-35D	* AC-497 or † AC-498 or ♦† AC-498D1 or ♦ AC-498D	† W-33TPS or ♦† W-33DS or ♦ W-33TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

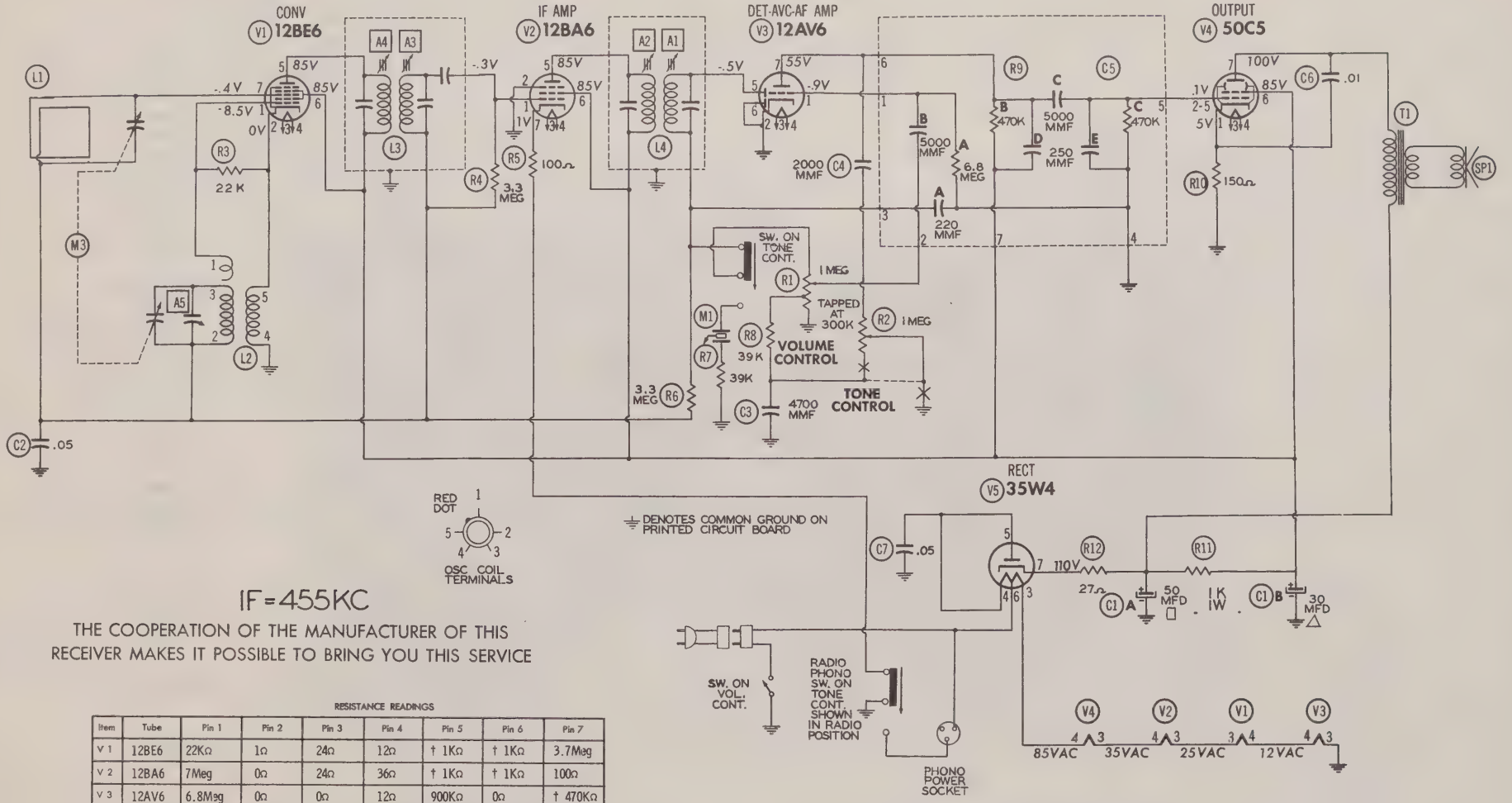
ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Tuning Cap.	19B632026	2 Gang
	Cabinet	16E634597	Model 56RF1
	Cabinet	16K634598	Model 56RF2
	Handle	55K634602	Carrying-Model 56RF1
	Handle	55K634601	Carrying-Model 56RF2
	Knob	36B634574	On-Off-Volume & Tone
	Knob	36B634575	Tuning



CHASSIS TOP VIEW

MOTOROLA
Model 56RF1 (Ch. HS-497)

SET 324 FOLDER 10



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1Ω	24Ω	12Ω	† 1KΩ	† 1KΩ	3.7Meg
V 2	12BA6	7Meg	0Ω	24Ω	36Ω	† 1KΩ	† 1KΩ	100Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	900KΩ	0Ω	† 470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	86Ω	470KΩ	† 1KΩ	† 230Ω
V 5	35W4	NC	NC	86Ω	125Ω	125Ω	117Ω	8KΩ

ALL MEASUREMENTS TAKEN IN RADIO POSITION.
TONE CONTROL MAXIMUM CLOCKWISE.
† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PHILCO MODELS D-664 (Code 124), D-665 (Codes 124, 126)

TRADE NAME	Philco Models D-664 (Code 124), D-665 (Codes 124, 126)
MANUFACTURER	Philco Corp., Tioga & "C" Streets, Philadelphia, Pa.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Converter, 1U4 IF Amplifier, 1U5 (or) 1S5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 3 Volts "A" Supply & 75 Volts "B" Supply
RATING	.15 Amp. @ 117 Volts AC (or) 150MA @ 3 Volts DC & 9MA @ 75 Volts DC
TUNING RANGE—BROADCAST	540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.
Set dial (before alignment) with gang closed to first gold mark below 550KC.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil	A1, A2 A3	Adjust for maximum output.
2.		Loop (radiated)	1620KC	1620KC*	"	A4	"
3.		"	1400KC	Tune to 1400KC signal.	"	A5	"
4.		"	600KC	Tune to 600KC signal.	"	A6	Adjust for maximum output while rocking tuning gang.

* Insert .006 inch non-metallic shim (or equivalent) between heel of rotor and top of stator plates. Close gang enough to hold shim. Remove shim without disturbing setting. Proceed with Step 2.

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PARTS LIST AND DESCRIPTIONS

PHILCO
MODEL D-664 (Code 124)

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	1R5	
V2	IF Amplifier	1U4	
V3	Det. -AVC-AF Amplifier	1U5	Note 1
V4	Output	3V4	

Note #1. 1S5 may be used in some versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲50	150	30-2585-1	E93D1	D029	FP409.6	TMQ125	Q-095 FM-1508	TVL-4428
B	■10	150							
C	▲40	150							
D	50	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.05	200	30-4650-45	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C3	47		62-047009001	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C4	7.5		30-1224-13							
C5A	4000		30-1239	BPD-2X004	D6-402	DK078	822-004	DCD-524	5HK-2D4	
B	4000				D6-402					
C6	.2	200	30-4650-49	P288N-22		CUB2P22		PT402	2TM-P22	
C7	5		30-1230	SI5	D6-050	G011	GP1K-050	ZT-555	5GA-V5	
C8	1000		30-1238-3	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C9	10000		30-1238-2	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C10A	7000		30-1239-7	BPD-0068	D6-682	K081	811-0068		5HK-D68	
B	220			SI220	D6-221	G051	811-221		5GA-T22	
C11	.004	600	30-4650-56	BPD-004	D6-402	CUB6D4	811-004	PT624	6TM-D4	
C12	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	Note 1

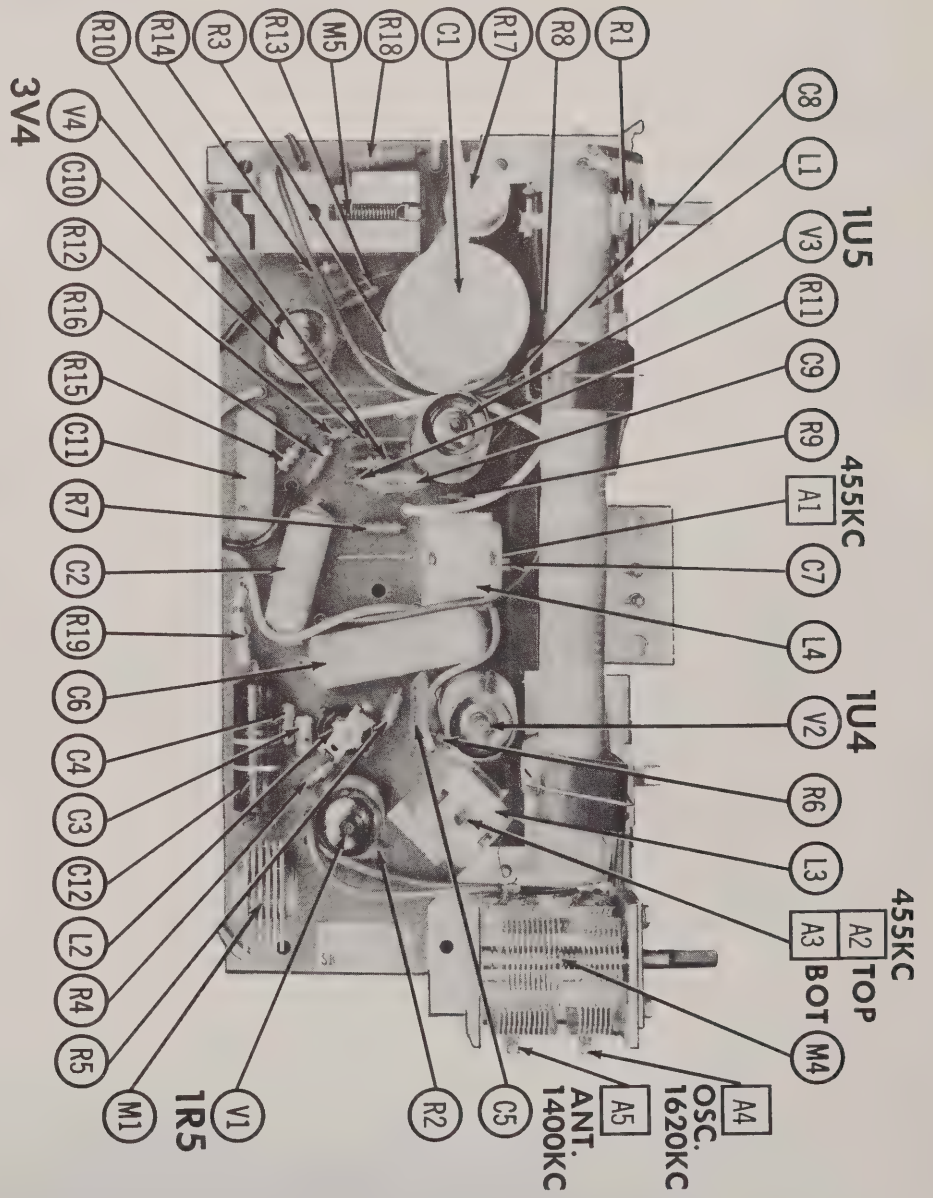
Note #1. Some versions use .047MFD in this application. (Part No. 30-4650-47).

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	33-5566-60	B-70-S	A47-1Meg-Z	Q13-137	U-53	Volume Note 1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	Not Req.	SWE-20	76-2	US-27	Attach to R1A

Note #1. Models D-664 (Code 124) and D-665 (Code 124) will use an alternate control Part No. 33-5566-70.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	PHILCO PART No.	IRC PART No.	
R2	820Ω		66-1828340	BTS-820	
R3	470Ω		66-1478340	BTS-470	
R4	68KΩ		66-3688340	BTS-68K	
R5	15KΩ		66-3158340	BTS-15K	
R6	3.3Meg		66-5338340	BTS-3.3Meg	
R7	2.2Meg		66-5228340	BTS-2.2Meg	
R8	2200Ω		66-2228340	BTS-2200	
R9	4.7Meg		66-5478340	BTS-4.7Meg	
R10	680KΩ		66-4688340	BTS-680K	
R11	4.7Meg		66-5478340	BTS-4.7Meg	
R12	2.2Meg		66-5228340	BTS-2.2Meg	
R13	1500Ω		66-2158340	BTS-1500	
R14	27Ω		66-0278340	BTS-27	
R15	470KΩ		66-4478340	BTS-470K	
R16	220Ω		66-1228340	BTS-220	
R17A	1130Ω	10	33-3447-7		Note 1
B	1130Ω	10			Note 1
R18	1800Ω	1	66-2184340	BTA-1800	Note 2
R19	60Ω	2	33-1334-18		Note 3

Note #1. Some versions use 1050Ω 10 W in this application. (Mfgr. Part #33-3445-8).
Note #2. Some versions use 820Ω 1 W in this application. (Mfgr. Part #66-1824340).
Note #3. Some versions use 120Ω 2 W in this application. (Mfgr. Part #33-1334-19).
Mfgr. states to replace with this special part only.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	10KΩ	3.4Ω	32-8434-1		A-2998	A-3329	29S49	S-11X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	36-1654-3	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	1Ω		32-4455-13				Note 1
L2	Osc. Coil	1.7Ω	6.5Ω	32-4618				
L3	Input IF	25Ω	25Ω	32-4583-1	16-6780		13-PC1	
L4	Output IF	34Ω	25Ω	32-4619				

Note #1. Part #76-9545 used in Models D-664, D-665, Code 124.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	PHILCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.068A	34-8003-18	1276	RS75	6S100	5M1	75S	

BATTERIES

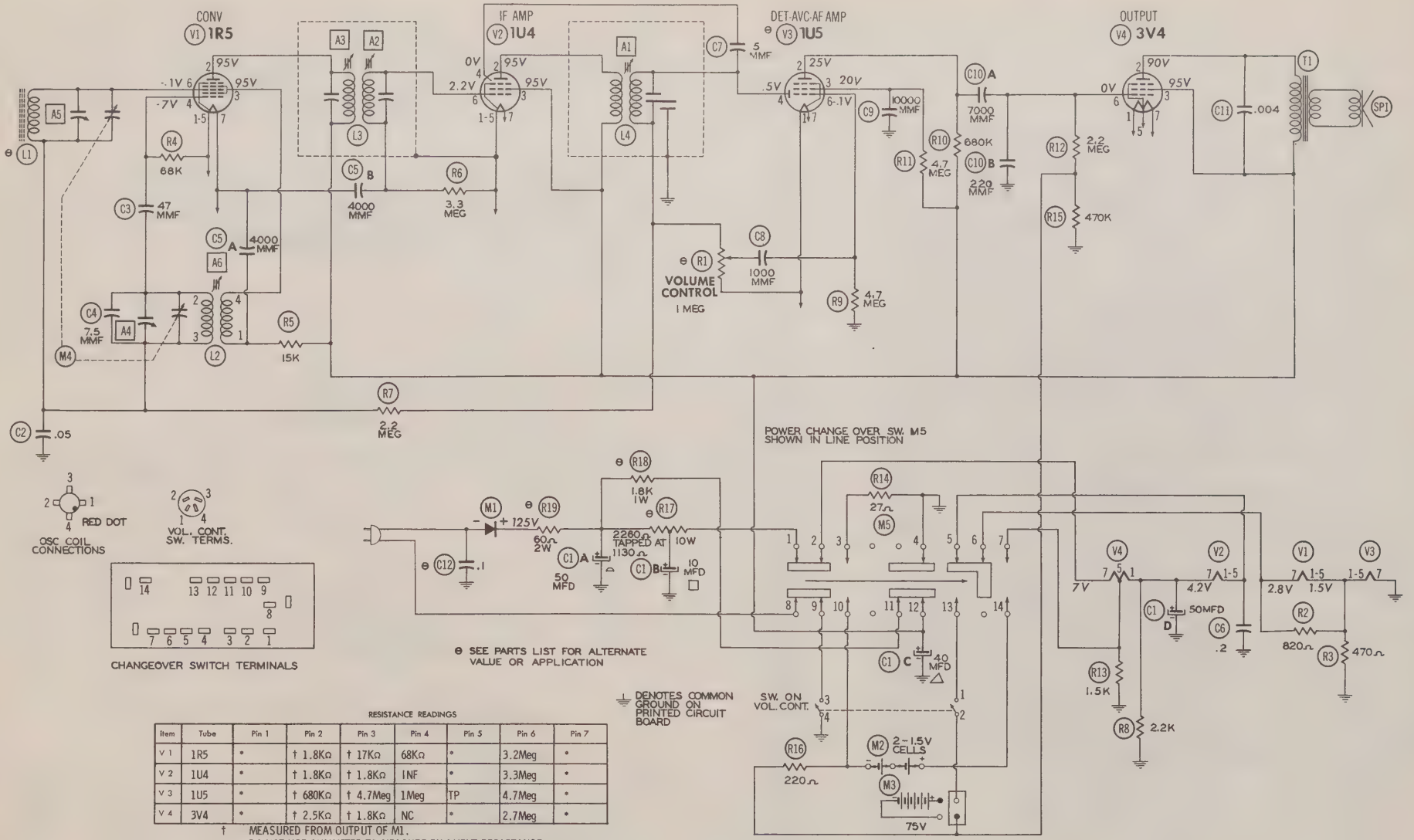
ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	3V "A"	P-77	964			21R			Connect 2 in Series.
M3	75V "B"	P-144		437			XX50		

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M4	Tuning Cap.	31-2735-6	2 Gang (22-330MMF, 12-140MMF) Model D-665 (Code 126).
M4	Tuning Cap.	31-2735-9	Models D-664, D-665 (Code 124).
M5	Switch	42-2033	Power Changeover (2 Position-Slide Type).
	Cabinet	11117	Two-Toned Green, Model D-664.
	Cabinet	11117-1	Two-Toned Gray, Model D-664.
	Cabinet	11117-2	Two-Toned Brown, Model D-664.
	Cabinet	11117-3	Star Frost, Model D-664.
	Cabinet	11117-4	Fiesta Red, Model D-664.
	Cabinet	11117-5	Coral & Grey, Model D-664.
	Cabinet	11117-6	Brown & Tan, Model D-664.
	Cabinet	11113	Light Green, Model D-665 (Code 124).
	Cabinet	11113-1	Brown Alligator, Model D-665 (Code 124).
	Cabinet	11113-2	Light Green, Model D-665 (Code 126).
	Cabinet	11113-3	Star Frost, Model D-665.
	Cabinet	11113-4	Fiesta Red, Model D-665.
	Handle	54-5211-5	Model D-664 (Two-Toned Green Cabinets).
	Handle	54-5211	Model D-664 (Two-Toned Gray Cabinets).
	Handle	54-5211-6	Model D-664 (Two-Toned Brown Cabinets).
	Handle	76-9786	Models D-664, D-665 (Star Frost Cabinets).
	Handle	76-9786-1	Models D-664, D-665 (Fiesta Red Cabinets).
	Handle	76-9786-2	Model D-664 (Coral & Grey Cabinets).
	Handle	76-9786-3	Model D-664 (Brown & Tan Cabinets).
	Handle	52-5211-4	Model D-665 (Light Green Cabinets).
	Handle	52-5211-3	Model D-665 (Brown Alligator Cabinets).
	Knob	54-6121-6	On-Off-Volume, Model D-664 (Two-Toned Green Cabinets).
	Knob	54-6121-10	On-Off-Volume, Model D-664 (Two-Toned Gray Cabinets).
	Knob	54-6121-8	On-Off-Volume, Model D-664 (Two-Toned Brown Cabinets).
	Knob	54-6121-13	On-Off-Volume Models D-664, D-665 (Star Frost Cabinets).
	Knob	54-6121-15	On-Off-Volume, Models D-664, D-665 (Fiesta Red Cabinets).
	Knob	54-6121-17	On-Off-Volume, Model D-664 (Coral & Grey Cabinets).
	Knob	54-6121-19	On-Off-Volume, Model D-664 (Brown & Tan Cabinets).
	Knob	54-6121-2	On-Off-Volume, Model D-665 (Code 124) Light Green Cabinets.
	Knob	54-6121-4	On-Off-Volume, Model D-665 (Brown Alligator Cabinets).
	Knob	54-6121	On-Off-Volume, Model D-665 (Code 126) Light Green Cabinets.
	Knob	54-6121-7	Tuning, Model D-664 (Two-Toned Green Cabinets).
	Knob	54-6121-11	Tuning, Model D-664 (Two-Toned Gray Cabinets).
	Knob	54-6121-9	Tuning, Model D-664 (Two-Toned Brown Cabinets).
	Knob	54-6121-12	Tuning, Models D-664, D-665 (Star Frost Cabinets).
	Knob	54-6121-14	Tuning, Models D-664, D-665 (Fiesta Red Cabinets).
	Knob	54-6121-16	Tuning, Model D-664 (Coral & Grey Cabinets).
	Knob	54-6121-18	Tuning, Model D-664 (Brown & Tan Cabinets).
	Knob	54-6121-3	Tuning, Model D-665 (Code 124) Light Green Cabinets.
	Knob	54-6121-5	Tuning, Model D-665 (Brown Alligator Cabinets).
	Knob	54-6121-1	Tuning, Model D-665 (Code 126) Light Green Cabinets.
	Knob	54-6122	Dial, Model D-665 (Code 126) Light Green Cabinets.

PHILCO MODEL D-664 (Code 124)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	•	† 1.8KΩ	† 17KΩ	68KΩ	•	3.2Meg	•
V 2	1U4	•	† 1.8KΩ	† 1.8KΩ	INF	•	3.3Meg	•
V 3	1U5	•	† 680KΩ	† 4.7Meg	1Meg	TP	4.7Meg	•
V 4	3V4	•	† 2.5KΩ	† 1.8KΩ	NC	•	2.7Meg	•

† MEASURED FROM OUTPUT OF M1.
• DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
TP TIE POINT.
NC NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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RAYHEON MODELS C-212B, M, C-220 (Ch. 21T42)

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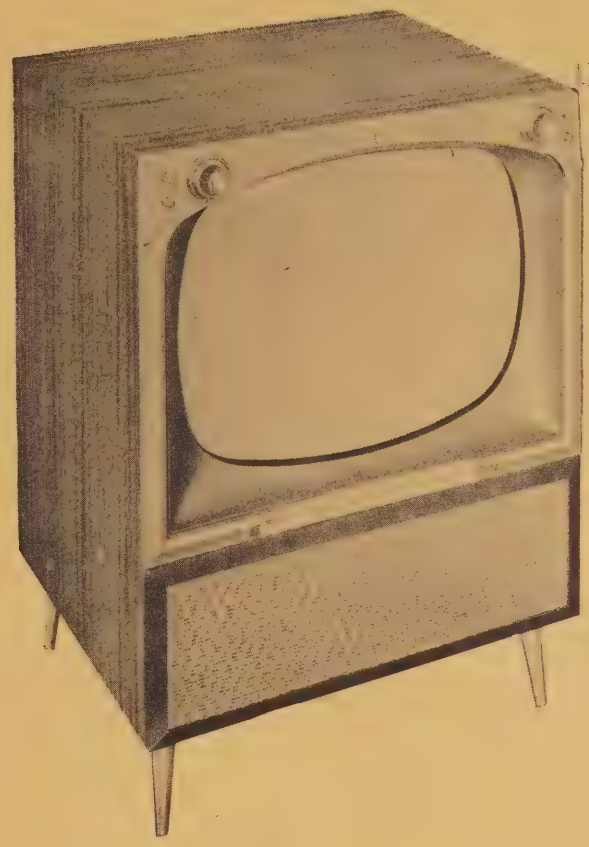

RAYTHEON MODEL C-212M

TRADE NAME	Raytheon Models C-212B, C-212M, C-220 (Ch. 21T42)
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Division, 5921 W. Dickens Ave., Chicago 39, Ill.
TYPE SET	Television Receiver
TUBES	Sixteen
POWER SUPPLY	105-115 Volts AC-60 Cycle — RATING 1.59 Amp. @ 115 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.75MC, Sound IF 22.25MC (Intercarrier)

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RAYHEON MODELS C-212B, M, C-220 (Ch. 21T42)

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RAYHEON MODELS C-212B, M, C-220 (Ch. 21T42)

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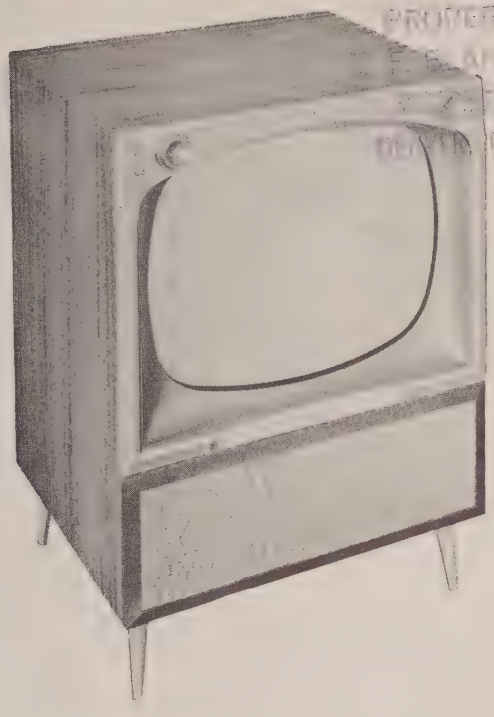

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 2 metal screws located behind channel selector and picture control knobs.
3. Place receiver safety glass down on a soft surface.
4. Remove 13 metal screws. Remove rear cover.
5. Remove 4 metal screws holding control assembly at the inside front of cabinet.
6. Remove 2 metal screws from AC interlock and antenna bracket.
7. Disconnect speaker leads, H. V. lead, picture tube socket and yoke plugs.
8. Remove 4 chassis bolts. Remove chassis.
9. Remove 4 wood screws. Remove speaker.

MODELS	CHASSIS
C-212B, C-212M, C-220	21T42

RAYHEON MODELS C-212B, M, C-220 (Ch. 21T42)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 2 metal screws holding name plate at the bottom edge of the safety glass. Remove name plate and safety glass. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See Tube Placement Chart on Page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R8) located on top of the chassis for maximum volume and MINIMUM buzz.

HORIZONTAL SIZE CONTROL

The horizontal size control is a brass sleeve located on the neck of the picture tube and slides between the yoke and the picture tube. Push sleeve into yoke to decrease size, pull out to increase size.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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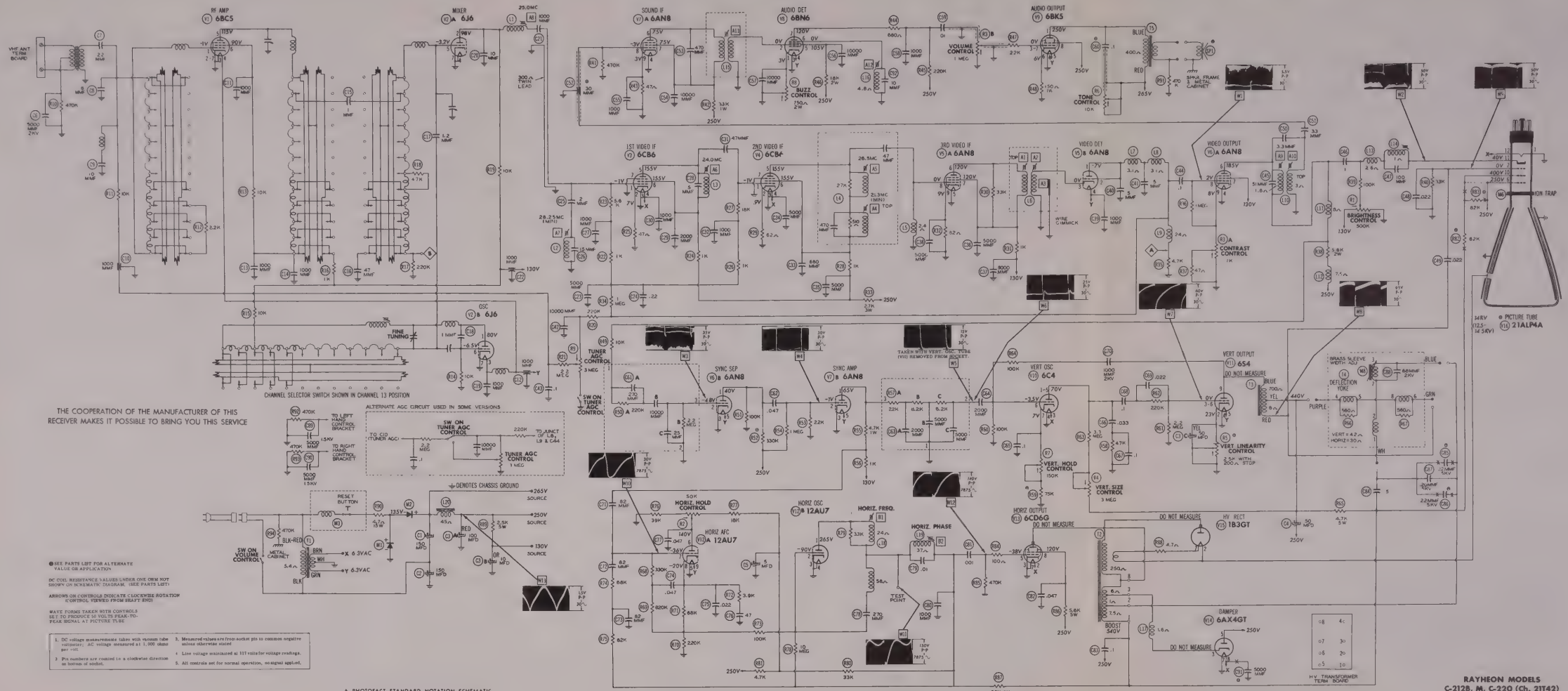

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction as bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.

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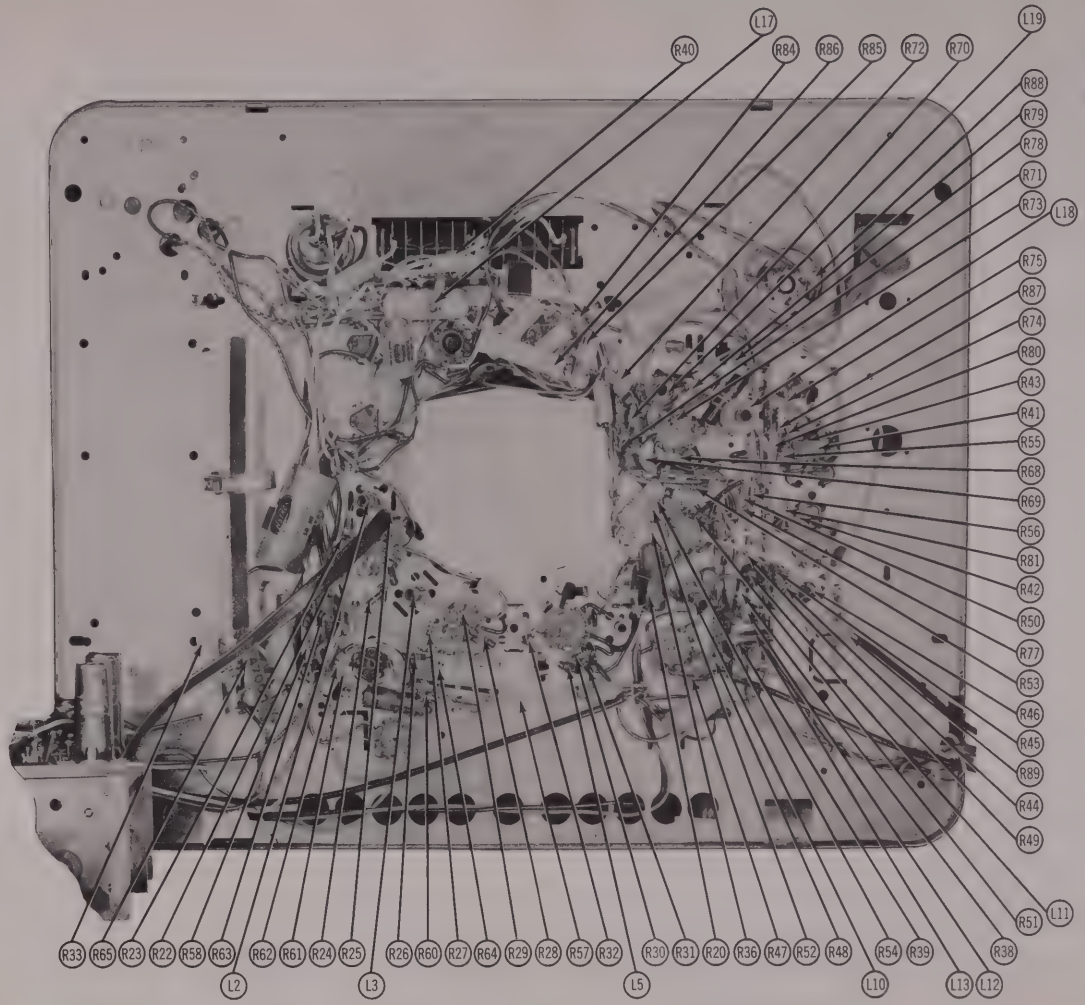
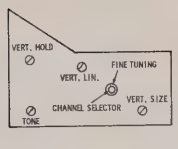
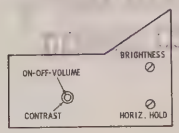
RAYTHEON MODELS
C-212B, M, C-220 (Ch. 21T42)

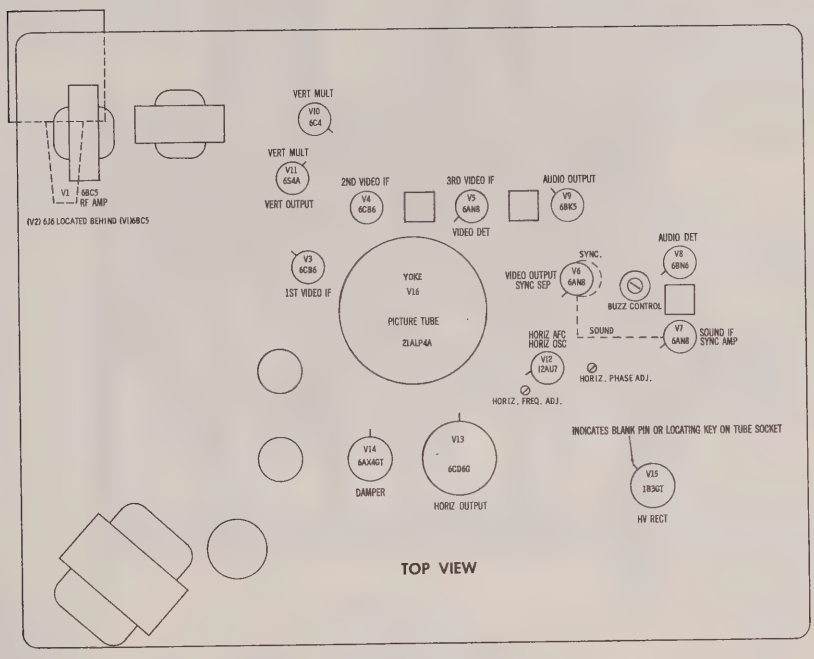


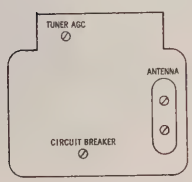
CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

TUBE PLACEMENT CHART









TUBE FAILURE CHECK CHART

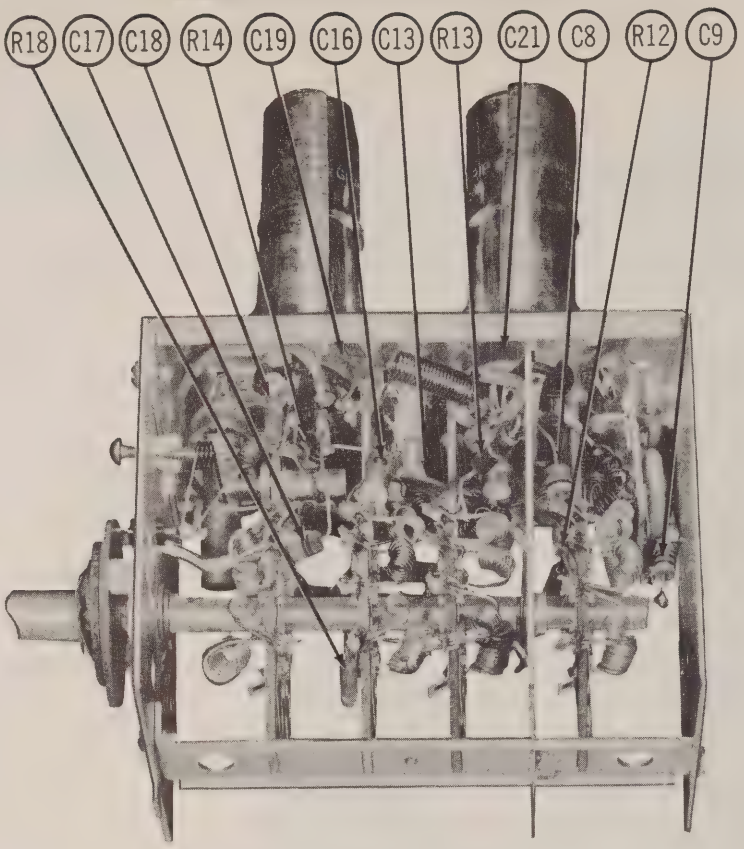
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifier (M1 & M2) Circuit Breaker (M3)**

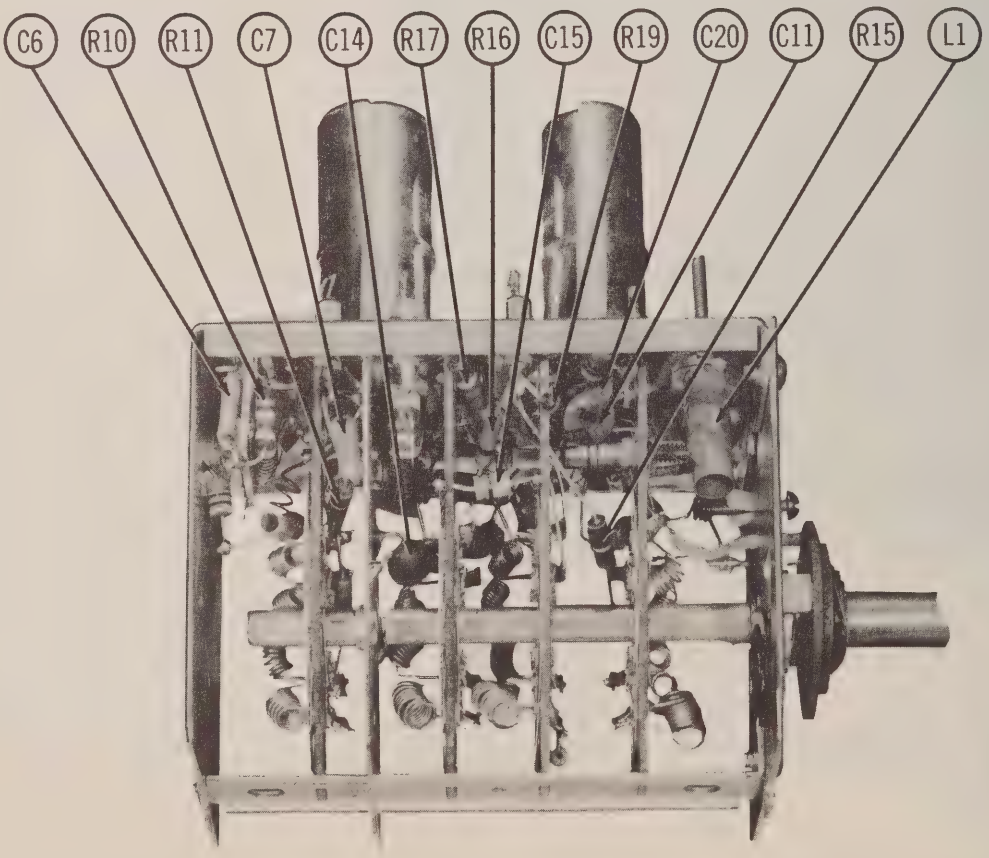
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V16**
Has pic, no sound - V7, V8, V9

SYNC FAILURE
No vert. sync - **V7, V10**
No horiz. sync - **V7, V12**
No vert. or horiz. sync - **V6, V7**

SWEEP FAILURE
No raster, has sound - **V12, V13, V14, V15, V16**
No vertical deflection - **V10, V11**
Poor vert. linearity or foldover - **V10, V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, V15, M1, M2**
Vert. off freq. - **V7, V10**
Horiz. off freq. - **V7, V12**



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V11) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use short shielded leads, to prevent regeneration.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001 MFD	High side to pin 8 (grid) of 6AN8 (V5A). Low side to chassis.	25MC (10MC Swp)	23.9MC 26.3MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2, A3	Connect a short jumper from pin 5 (plate) to pin 6 (screen) of 6CB6(V4). Adjust for response curve similar to Fig. 1 with markers at 90%. A3 is a coupling rod and affects bandwidth. Remove short from pin 5 to pin 6 of V4.
2.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	Not used	21.3MC (Unmod)	"	USE VTVM DC probe to point (A). Common to chassis.	A4	Adjust for MINIMUM deflection.
3.	"	"	"	26.5MC	"	"	A5	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM. Repeat step 2.
4.	"	"	"	24.0MC	"	"	A6	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM.
5.	"	"	"	28.25MC	"	"	A7	Adjust for MINIMUM deflection.
6.	"	"	"	25.0MC	"	"	A8	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM.
7.	"	"	25MC (10MC Swp)	21.3MC 23.8MC 26.75MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig.2. Rock A7 for flat-topped response. Increase sweep generator output and use high scope gain to view 22.25MC trap region. Adjust A4 so that 21.3MC occurs at peak of pop up portion preceding trap notch. 22.25MC should fall in trap notch. If response obtained is not similar to Fig.2, repeat steps 1 thru 6.

SOUND IF ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Tune in a TV signal and adjust the fine tuning control until sound bars just appear in the picture. Adjust A9 fully counterclockwise, then clockwise until the horizontal scanning lines are smooth and continuous. Readjust the fine tuning control for clearest picture and best sound. Insert an attenuator in series with the antenna and the receiver antenna terminals so that the signal strength may be varied from weak to strong. If a suitable attenuator is not available feed the signal to the receiver by placing the antenna lead-in near the antenna terminals.
Reduce the signal input to the receiver so that the signal falls below the limiting level of the 6BN6 (Audio-Detector) as evidenced by a "hiss" in the sound. Adjust the secondary of the sound take-off transformer (A10), the sound IF transformer (A11), the quadrature coil (A12), and the buzz control (R8) for maximum sound and minimum buzz. If hiss disappears while adjusting increase attenuation until hiss reappears.

TUNER ALIGNMENT

The tuner portion of this receiver has been properly aligned at the factory and is very stable. Alignment of the tuner should not be necessary in the field.

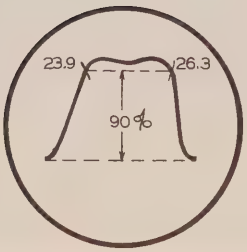


FIG.1

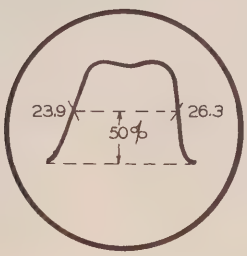
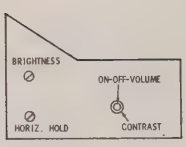


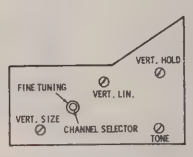
FIG. 2

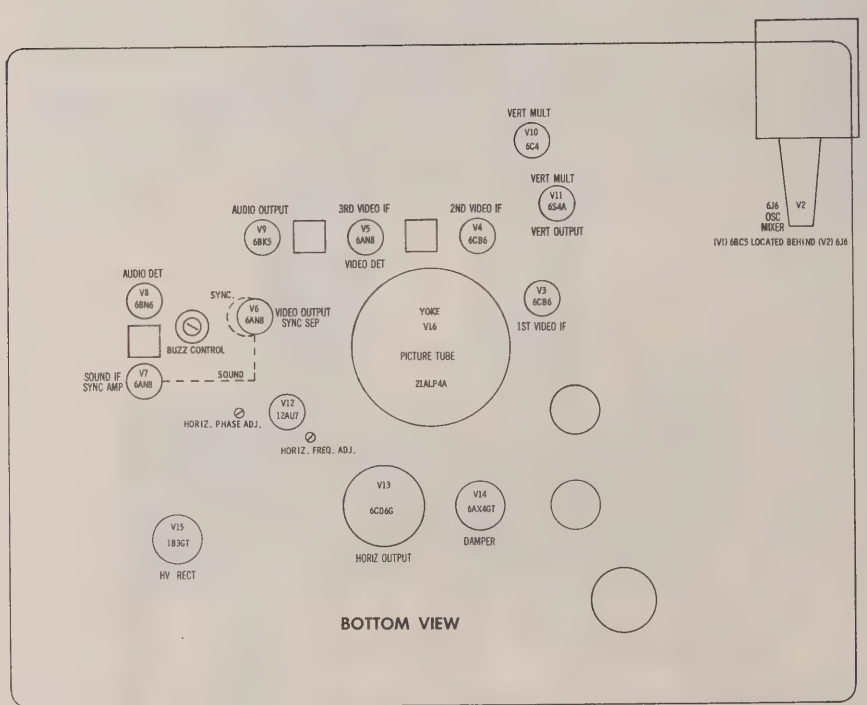
RESISTANCE MEASUREMENTS

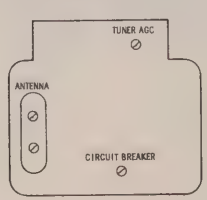
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	0Ω	. 1Ω	† 3. 5KΩ	† 14KΩ	0Ω		
V 2	6J6	† 13KΩ	† 13KΩ	. 1Ω	0Ω	220KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	0Ω	. 1Ω	† 3. 7KΩ	† 3. 7KΩ	0Ω		
V 4	6CB6	1Meg	62Ω	0Ω	. 1Ω	† 3. 7KΩ	† 3. 7KΩ	0Ω		
V 5	6AN8	4. 7KΩ	4. 7KΩ	. 1Ω	. 1Ω	0Ω	† 3. 5KΩ	† 3. 5KΩ	2. 4Ω	82Ω
V 6	6AN8	† 90KΩ	2. 2Meg	0Ω	0Ω	. 1Ω	† 5. 6KΩ	† 2. 5KΩ	1Meg	50Ω
V 7	6AN8	† 8. 2KΩ	22KΩ	0Ω	0Ω	. 1Ω	† 33KΩ	† 33KΩ	470KΩ	47Ω
V 8	6BN6	320Ω	. 3Ω	0Ω	. 1Ω	† 18KΩ	4. 8Ω	† 220KΩ		
V 9	6BK5	† 400Ω	NC	400KΩ	. 1Ω	0Ω	150Ω	400KΩ	† 45Ω	TP
V 10	6C4	▲ 4Meg	NC	. 1Ω	0Ω	▲ 4Meg	100KΩ	130KΩ		
V 11	6S4	NC	1KΩ	2. 2Meg	0Ω	. 1Ω	2. 2Meg	NC	NC	▲ 5KΩ
V 12	12AU7	▲ 40KΩ	300KΩ	0Ω	0Ω	0Ω	† 35KΩ	1. 2Meg	280KΩ	. 1Ω
V 13	6CD6G	TP	. 1Ω	0Ω	TP	470KΩ	TP	0Ω	† 5. 6KΩ	TOP CAP ▲ 8Ω
V 14	6AX4GT	TP	NC	70KΩ	NC	† 45Ω	TP	0Ω	. 1Ω	
V 15	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 258Ω
V 16	21ALP4A	0Ω	33KΩ	PIN 6 † 45Ω	PIN 10 ▲ 50KΩ	PIN 11 † 180KΩ	PIN 12 . 1Ω			

† MEASURED FROM OUTPUT OF M2.
▲ MEASURED FROM PIN 3 OF V14.
NC-NO CONNECTION.
TP-TIE POINT.

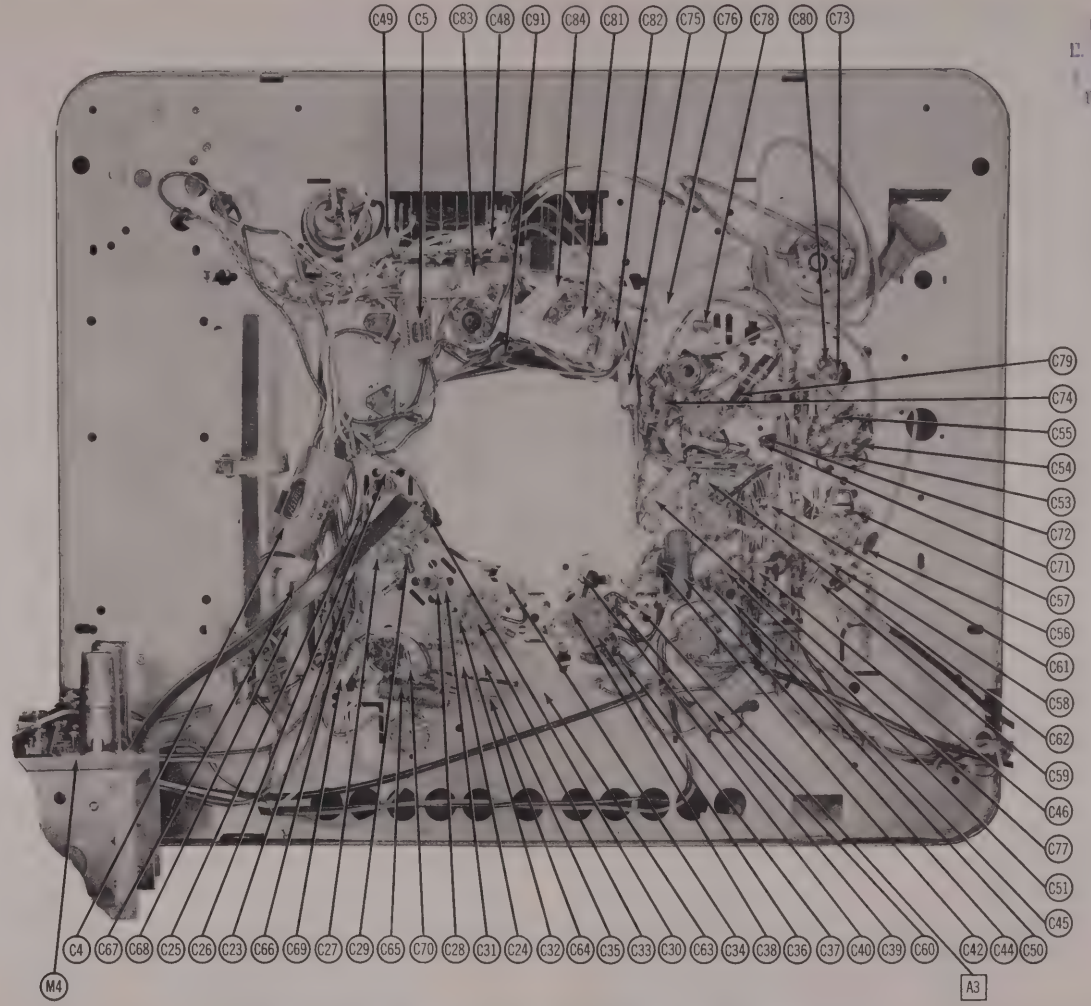








TUBE PLACEMENT CHART



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

CHASSIS TOP VIEW

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BC5	
V2	Mixer-Oscillator	6J6	
V3	1st. Video IF Amplifier	6CB6	
V4	2nd. Video IF Amplifier	6CB6	
V5	3rd Video IF Amplifier- Video Detector	6AN8	
V8	Video Output-Sync Separator	6AN8	
V7	Sound IF Amp.-Sync Amp.	6AN8	

ITEM No.	USE	TYPE	NOTES
V8	Audio Detector	6BN8	
V9	Audio Output	6BK5	
V10	Vert.Mult.	6C4	
V11	Vert. Mult.-Vert.Output	6B4	
V12	Horiz. AFC-Horiz. Osc.	12AU7	
V13	Horiz Output	6CD6G	
V14	Damper	5AX4GT	
V15	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA				NOTES	
	RAYTHEON PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.		
V16	21ALP4A①	21ALP4A ①	21ALP4A ①	21ALP4A ①	① Aluminized ② Silver screen "SB"	
				21ALP4A/B ②		
		21ALP4B ①				
		21ALP4	21ALP4			
	21ATP4 ①	21ATP4 ①	21ATP4 ①	21ATP4 ①		
				21ATP4A ②		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP	VOLT	RAYTHEON PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	FYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	150	150	SC-23464	AFHH-70	XA064	FPU7	TM-150-150	T-050	TYL-1436
C2	150	150	SC-22463	AFHH-70	XA064	FPU7	TM-150-150	T-050	TYL-1428
C3A	100	300	SC-23303	RE1042	D002	WQ635	TM-3137	T-537	R2227 *
B	10	300			BR505		MT-0525		
C	50	50							
C4	50	350	SC-23532	PRS350V50	BR5035	TC79	TD-50-450	FM-4540	TVA-1713
C5	5	300	SC-24174	PRS350V4	BR435	TC60	TD-5-350	FM-3508	TVA-1501

* Unit must be ordered from Mfgr .

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							
	CAP.	VOLT	RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	5000	2000	RC6-90087		DDH-502	V20S	1R5KV-472		30HK-D5	
C7	22		RC6-90083	MPG-SI22	TC2-22	TC2H	HPDK-220		STCC-Q22	
C8	18				TC2-18	TE2S	HPDK-180		MS-418	
C9	10			MPG-SI10	TC2-10	TE09	HPGA-100	TF-541	STCC-Q1	
C10	1000									
C11	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C12	1000									
C13	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C14	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C15	1.			MPD-SI1	TC2-1	TE03	HPGA-010		STCC-Q1-V1	
C16	47			MPG-SI47	TC2-47	TE22	MPG-S38-470	TF-5447	STCC-Q47	
C17	1.2									
C18	1									
C19	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C20	10		RC6-90083	MPG-SI10	TC2-10	TE09	HPGA-100	TF-541	STCC-Q1	
C21	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C22	1000									
C23	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C24	.22	200		P288N-22		CUSBP22		PT4022	2TM-P22	
C25	2									
C26	15			MPG-SI15	TC2-15	TE11	MPGK-150		STCC-Q15	
C27	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C28	5			MPG-SI5	TC2-5	2001	MPGA-050	ZT-555		
C29	2000			BPD-002	DD-202	KD72	501-002	DC-522	5HK-D2	
C30	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C31	47			BPD-00047	DD-470	GO33	831-470	UC-5447	5GA-Q47	
C32	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C33	680			SI680	D6-681	TP90	GPSK-681	UC-5368	5GA-T68	
C34	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C35	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C36	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C37	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C38	5000			BPD-005	DD-502	KD80	511-005	DC-525	5HK-D5	
C39	1000			BPD-001	DD-102	KD69	501-001	DC-521	5HK-D1	
C40	6			MPG-SI5		2011	MPGA-050	ZT-555		
C41	5			MPG-SI5		2011	MPGA-050	ZT-555		
C42	10000			BPD-01	DD-103	KD82	511-01	DC-511	5HK-S1	
C43	.1	300		P288N-1	DF-104	CUSBP1		PT401	3TM-P1	
C44	.1	300		P288N-1	DF-104	CUSBP1		PT401	3TM-P1	
C45	01									
C46	.1	600		P488N-1	DF-104	CUSMP1		PT401	4TM-P1	
C47	300			MPG-SI300	TC2-300	TE30	801-301	MC2255	STCC-T1	
C48	.022	200		BPD-03	DF-203	CUSBS22	817-03	PT4123	2TM-S22	
C49	.022	400		BPD-02	DF-203	CUSMS22	817-02	PT4122	4TM-S22	
C50	3.3			MPG-SI3.3	TC2-3R3	TE06	MPGA-3R3	ZT-5533	STCCB-V33	
C51	33			MPG-SI33	TC2-33	TE26	MPGL-330	ZT-5433	STCC-Q33	
C52	30		143-23773							Note 3
C53	470			1469-00047	D6-471	SR5747	SI1-471		MS-347	
C54	10000			BPD-01	DD-103	KD82	511-01	DC-511	5HK-S1	
C55	1000			BPD-001	DD-103	KD69	501-001	DC-521	5HK-D1	
C56	10000			BPD-01	DD-103	KD82	511-01	DC-511	5HK-S1	
C57	10000			BPD-01	DD-103	KD82	511-01	DC-511	5HK-S1	
C58	1000			BPD-001	DD-103	KD69	501-001	DC-521	5HK-D1	
C59	.01	400		BPD-01	D6-103	CUSM01	GP3-333-103	PT411	4TM-S1	
C60	.1	600		P588N-1	DF-104	CUSMP1		PT501	4TM-P1	Note 1
C61A	270			SI1-00027		SR5727	SI1-271		4TM-S27	
B	10000		† 17A-24212	BPD-01	†PC-263	KD82	SI1-01	DC-511	5HK-S1	
C	25			SI1-000025		TP23	GPSK-250	UC-5425	5GA-Q25	
C62	.047	300		BPD-05	DF-503	CUSB047		PT4147	3TM-S47	
C63A	2000							DC-523		
B	5000		‡17A-23276	‡PA-130	‡PC-100	‡1167141	‡1405-01	DC-525	‡V-1	
C	5000							DC-525		
C64	3000			SI2000	D6-202	TP56	801-002	UC-522	5HK-D2	
C65	.1	200		P288N-1	DF-104	CUSBP1		PT401	3TM-P1	
C66	.033	400		BPD-03	DF-303	CUSMS33		PT4133	4TM-S33	
C67	.1	300		P288N-1	DF-104	CUSBP1		PT401	3TM-P1	
C68	.1	400		P488N-1	DF-104	CUSMP1		PT401	4TM-P1	
C69	.022	200		BPD-02	DF-203	CUSBS22	817-02	PT4122	2TM-S22	
C70	1000	2000	8C-24991	BVD-30-1000	DD30-102	VD31	3KV-102	DC3521	20GA-D1	
C71	82			1468-00082	TC2-82	22R5Q82	MPG-337-820		MS-482	
C72	82			1468-00082	TC2-82	22R5Q82	MPG-337-820		MS-482	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C73	82			1469-00082	TC2-82	22R5Q82	MPG-337-820		MS-482	
C74	.047	300		BPD-05	DF-503	CUSB047		PT4147	3TM-S47	
C75	.033	300		BPD-03	DF-303	CUSB033	817-03	PT4133	3TM-S33	
C76	.47	400		P468N-47		CUSMP47		PT4047	4TM-P47	
C77	.047	400		BPD-05	DF-503	CUSM047		PT4147	4TM-S47	
C78	270			NPO-SI270	TC2-270	22R5T27	SI1-271		MS-327	
C79	.01	600							6TM-S1	
C80	1000			1464-001		1R5D1	SI1-102	MC3255	MS-21	
C81	.001	600		BPD-001	D6-102	CUSM1D	GP3L-103	PT621	6TM-D1	
C82	.047	400		BPD-05	DF-503	CUSM047		PT4147	4TM-S47	
C83	.1	600		P688N-1	DF-104	CUSMP1		PT601	6TM-P1	
C84	.15	200		P288N-15		CUSBP15		PT4015	2TM-P15	
C85	22	5000		HVD-50-22					50GA-Q22	Note 2
C86	22	5000		HVD-50-22		DD30-121			50GA-Q22	Note 2
C87	100	6000	8G-25225						60GA-Q10	
C88	68	3000		HVD-30-68	DD30-680	V2G68	3KV-680	DC30468	30GA-Q68	
C89	1000	1500		HVD-15-4700	DD15-502	V2D6	1R5KV-472		20HK-D6	
C90	5000	1500		HVD-15-4700	DD15-502	V2D6	1R5KV-472		20HK-D6	
C91	6000			BPD-006	DD-503	KD80	SI1-005	DC-525	5HK-D6	Note 3
C92	10									

Note 1. Some versions may use a .022MFD ② 600V unit.
Note 2 - Not used in some versions.
Note 3 - C91 is the capacity of the sound IF coupling shielded lead.
† Items C61A, C61B, C63C, R50A and R50B are combined in one unit.
‡ Items C63A, C63B, C63C, R57A, R57B and R57C are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	1	B10B-25915	AB-59	A47-500K-S	QH-133	U-50	Brightness
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R1A.
R2A	50KΩ	½	B10B-25917	AB-51	A47-50K-S	QH-123	U-35	Horiz. Hold
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R2A.
R3A	1000Ω	½	B10A-25913	F1-5	R7V-578	UF13K		Contrast (Panel)
B	1Meg	½		R2-58		U1M4	†	Volume (Rear)
C	Switch			KB-1		U8-58		Attach to R3B.
R4A	3Meg	½	B10B-25918	AB-54	A47-3Meg-S	QH-140	U-59	Vert. Size
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R4A.
R5A	2500Ω	½	B10B-25919	▪ AB-7	▪ A47-3000Ω	▪QH-113	▪ U-6	Vert. Linearity
	with 200Ω stop							
B	Shaft		Not Req.	AK-3	KS8-3	Not Req.	Not Req.	Attach to R5A.
R6A	10KΩ	½	B10B-25916	AB-14	A47-10K-S	QH-118	U-20	Tone
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R6A.
R7A	150KΩ	½	B10B-25920	AB-48	A47-150K-S	QH-129	U-43	Vert. Hold
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R7A.
R8	750Ω	2	A10D-23857		59-750			Buzz-Wire Wound
R9A	1Meg	½	B10A-25967	B-84-S	A47-1Meg-S	QH-140	U-59	Tuner AGC
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R9A.
C	Switch		Not Req.	Not Req.	SWE-12	T6-1	U8-58	Attach to R9A.

▪ Connect a 220Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
† Universal Replacement (Mallory Exact Duplicate Part No. UE68S).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RAYTHEON PART No.	IRC PART No.	
R10	470KΩ			BTS-470K	
R11	100Ω			BTS-100	
R12	2200Ω			BTS-2200	
R13	10KΩ			BTS-10K	
R14	10KΩ			BTS-10K	
R15	10KΩ			BTS-10K	
R16	1000Ω			BTS-1000	
R17	2200Ω			BTS-220K	
R18	4700Ω			BTS-4700	
R19	10KΩ			BTS-10K	
R20	220KΩ			BTS-220K	
R21	2.2Meg			BTS-2.2Meg	
R22	1.0Meg			BTS-1.0Meg	
R23	1000Ω			BTS-1000	
R24	5600Ω			BTS-5600	
R25	10000Ω			BTS-10000	
R26	470Ω			BTS-47	
R27	1000Ω			BTS-1000	
R28	18KΩ			BTS-18K	
R29	1000Ω			BTS-1000	
R30	6310 5%		99U-130	BTS-6K8	
R31	33KΩ			BTS-33K	
R32	1000Ω			BTS-1000	
R33	82Ω			BTS-82	
R34	2700Ω	5	9C11-1104		
R34	1Meg			BTS-1Meg	
R35	4700Ω			BTS-4700	
R36	1Meg			BTS-1Meg	
R37	47Ω			BTS-47	
R38	56000Ω	2		BTS-5600	
R39	100KΩ			BTS-100K	
R40	33KΩ			BTS-33K	
R41	470KΩ			BTS-470K	
R42	330Ω	1		BTA-330	
R43	47Ω			BTS-47	
R44	560Ω			BTS-560	
R45	220KΩ			BTS-220	
R46	16KΩ	2		BTS-18K	
R47	22KΩ			BTS-22K	
R48	150Ω	1		BTA-150	
R49	10KΩ			BTS-10K	
R50A	220KΩ		† 17A-24212	BTS-330K	
B	2.2Meg			BTS-2.2Meg	
R51	100KΩ			BTS-100K	
R52	330KΩ			BTS-330K	Note 1

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RAYTHEON PART No.	IRC PART No.	
R53	22KΩ			BTS-22K	
R54	1Meg			BTS-1Meg	
R55	4700Ω	1		BTA-4700	
R56	1000Ω			BTS-1000	
R57A	22KΩ			BTS-22KΩ	
B	8200Ω		‡ 17A-23276	BTS-8200Ω	
C	6200Ω			BTS-6200Ω	
R58	100KΩ			BTS-100K	
R59	75KΩ 5%			BTS-75K 5%	Note 2
R60	100KΩ			BTS-100K	
R61	2.2Meg			BTS-2.2Meg	
R62	220KΩ			BTS-220KΩ	
R63	1.0Meg			BTS-1.0Meg	
R64	100KΩ			BTS-100K	
R65	470KΩ	5	9C12-1107		
R66	560Ω				
R67	560Ω				
R68	330KΩ			BTS-330K	
R69	820KΩ			BTS-820K	
R70	220KΩ			BTS-220K	
R71	68KΩ			BTS-68K	
R72	3900Ω			BTS-3900	
R73	100KΩ				
R74	68KΩ			BTS-68K	
R75	82KΩ			BTS-82K	
R76	39KΩ				
R77	18KΩ				
R78	10Meg				
R79	33KΩ				
R80	33KΩ				
R81	4700Ω				
R82	82K			BTS-82K	Note 3
R83	82K			BTS-82K	Note 3
R84	100Ω			BTS-100	
R85	470KΩ			BTS-470K	
R86	5600Ω	5	9C13-1106		
R87	82KΩ	1		BTA-82K	
R88	4.7Ω		9C1-1071	2W1-4.7	
R89	2500Ω	5	9C-24033	PW7-2500	
R90	4.3Ω 5%	15	9C-25068		
R91	470KΩ			BTS-470K	
R92	470KΩ			BTS-470K	
R93	470KΩ			BTS-470K	
R94	470KΩ			BTS-470K	

Note 1. Some versions use a 560KΩ ½W resistor in this application.
Note 2. Some versions use a 68KΩ ½W resistor in this application.
Note 3. Not used in some versions.
† Items R50A, R50B, C61A, C61B, C63C are combined in one unit.
‡ Items R57A, R57B, R57C, C63A, C63B, C63C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	12.6V			12D-25583	F5905 ①	P2966 ②		21F24 ②	F-42A ①
	① 6A	② 6.5A								

① Parallel and phase 12.5V windings.
② Connect in series and phase 6.3V windings , tape 6.3V CT winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							
		RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz Output Trans.	12E-25423	FB548 *	HVO-58 *		X136 *		F1L7-80 *	D-83 *
T3	Vert. Output Trans.	12E-25040-2	Q 3-3038 1	222T1 ②		A-8143 1		26S53 1	A-99Z ①
T4A	Yoke(Horiz.(10MH)	20D-25350 ③	MDP-62④	235D1 ③		Y80F10.A3		DY-16A ③	Y-41-1 ③
B	Vert.(40MH)	16M-23770 ③	? ④	? ③		? ③		Y-16 ③	? ③

① Connect as auto transformer.
② Use 1Ω to 1 turns ratio.
③ Drill new mounting hole(s).
④ Includes capacitor C86; resistors R86 and R87.
⑤ Yoke rear cover and centering device.
⑥ Use original rear cover and centering device.
⑦ Loosen and rotate core clamp to duplicate original shield mounting.
⑧ Connect horizontal damping network across terminals #3 and #7. Use original U necessary.
⑨ Use original horizontal yoke damping network if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL (CONNECTIONS)	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8	8	8	8	8	8	8	8
3	3	6	6	6	6	6	3
2	2	3	3	3	3	3	2
1	9	2	2	2	2	2	9

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI	SEC	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	7KΩ	3-4Ω	12C-23704	Z1113	A3296	A3878	26S48	S-7X	

SPEAKER

ITEM No.	RATINGS				REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.		RAYTHEON PART No.	QUAM PART No.	RCA TYPE No.	
SP1	6½ x 9"	PM	3-4Ω		18A-25937 1	6A1	221C1	1 Used in Models C-312M, C-212B.
	8 x 9"	PM	3-4Ω		18A-25926 2	8PA2	238S1	2 Used in Model C220.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA			NOTES
		PRI.	SEC.	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	1st Video IF	.3Ω		13M-25686				
L2	28.25MC Trap	.1Ω		20D-23819				
L3	2nd Video IF	.1Ω		201-24043				
L4	3rd Video IF	.1Ω		201-24043				
L5	RF Choke	3.4Ω		20D-20255	19-3036	TV-180	6176	
L6	4th Video IF	.1Ω	.1Ω	123-23887				
L7	Series Peaking Coil	3.1Ω		16A-22923	19-6022		6152	22 Microhenries
L8	Series Peaking Coil	3.1Ω		16A-22923	19-6022		8152	22 Microhenries
L8	Shunt Peaking Coil	24Ω		16A-19365	19-4400		6136	430 Microhenries
L10A	4.5MC Trap	1.6Ω						
B	1st Sound IF	3Ω		201-23729				
L11	Series Peaking Coil	.8Ω		16A-21591	19-3300		6155	305 Microhenries
L13	Shunt Peaking Coil	7.5Ω		16A-20970	19-3380	TV-186	6130	
L15	Series Peaking Coil	2.6Ω		16A-24090	19-1005		4612	
L14	4.5MC Trap	.1Ω	.3Ω	16A-23441	20-1004	TV-151	1669	
L16	2nd Sound IF	.3Ω	.3Ω	201-23878				
L16	Quadrature Coil	4.3Ω		201-23727			1680	
L17	RF Choke	1.6Ω		16A-21701	19-1008		6813	8 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA						NOTES
	PRI	SEC	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L18	12Ω	58Ω	12E-24440			6213				Horiz. Osc.
L19	37Ω		13M-25678			6314				Horiz. Phase Coil

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE @ CURRENT 1000 (^)	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L20	230A	45Ω	1.45Y	18D-25146	C5027 ①	C2966 ①	C2326 ①	26C44	C-17X ①

① Drill one new mounting hole.

RAYTHEON
MODELS C-212B, M, C-220 (Ch. 21T42)

PARTS LIST AND DESCRIPTIONS (Continued)

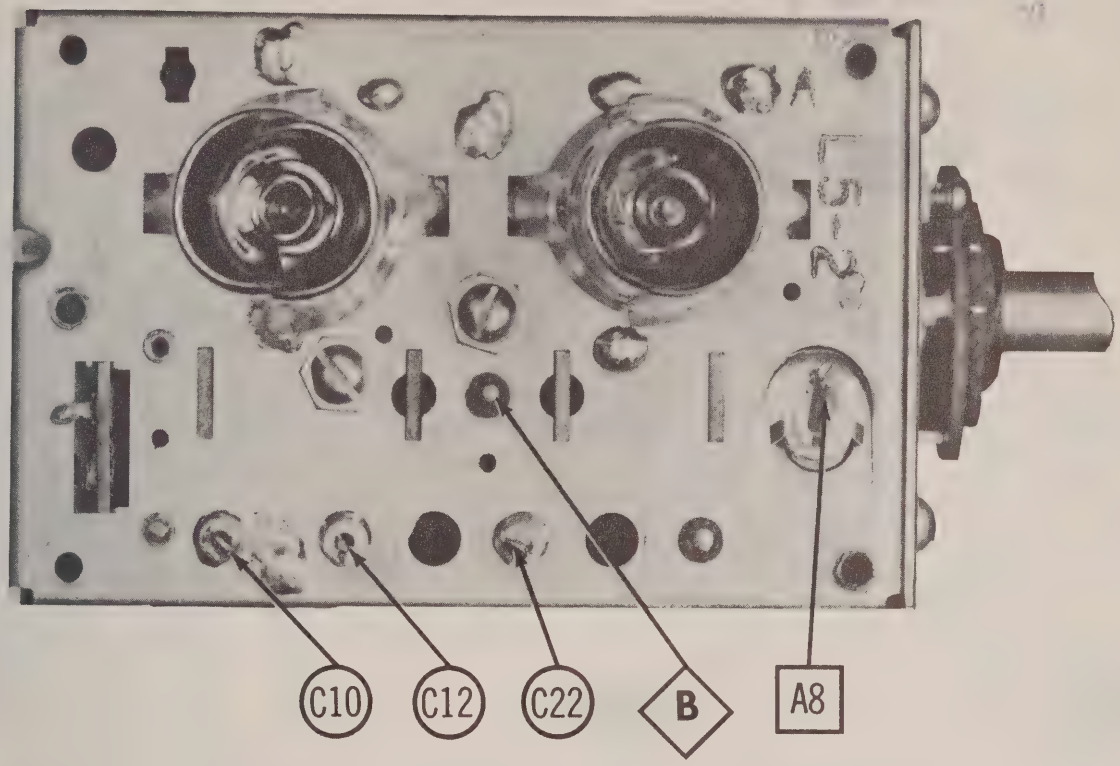
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	RAYTHEON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.280A	21J25315	1241A	MR350	6S350	6QA2	350A	
M2	.280A	21J25315	1241A	MR350	6S350	6QA2	350A	

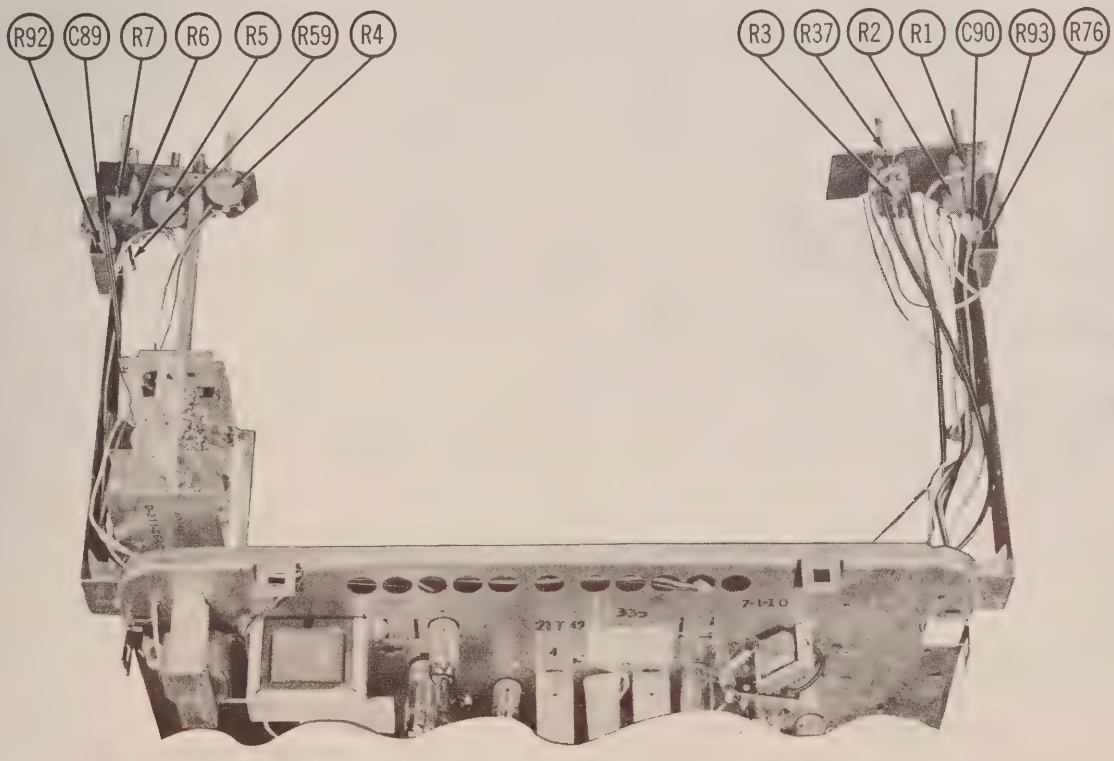
MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M3	Circuit Breaker	20F-25568	Low Voltage Protection
M4	Tuner	D-211-26406 *	VHF
M5	Centering Device	16M-23770	Includes Deflection Yoke (T4) Rear Cover
M6	Ion Trap	16M-19705	
M7	Correction Magnet	16M-22873	
M8	Width Control	2C-25229	
	Cabinet Assy.	200-25979	Model C-212-M
	Cabinetq Assy.	200-25979-1	Model C-212-B
	Cabinet Assy.	200-26463	Model C-220
	Knob	5B-25897-A29	Picture
	Knob	5B-25899-A195	On-Off-Volume-Models C-212-M, C-220
	Knob	5B-25899-A194	On-Off-Volume-Model C-212-B
	Knob	5B-25903-A194	Horiz. Hold - Model C-212-B
	Knob	5B-25903-A195	Horiz. Hold-Models C-212-M , C-220
	Knob	5B-25904-A194	Brightness-Model C-212-B
	Knob	5B-25904-A195	Brightness-Models C-212-M, C-220
	Knob	5B-25900-A194	Vert. Hold-Model C-212-B
	Knob	5B-25900-A195	Vert. Hold-Models C-212-M, C-220
	Knob	5B-25905-A194	Tone-Model C-212-B
	Knob	5B-25905-A195	Tone-Models C-212-M, C-220
	Knob	5B-25896-A29	Fine Tuning
	Knob	5B-25898-A194	Station Selector-Model C-212-B
	Knob	5B-25898-A195	Station Selector-Models C-212-M, C-220
	Safety Glass	30M-25931	

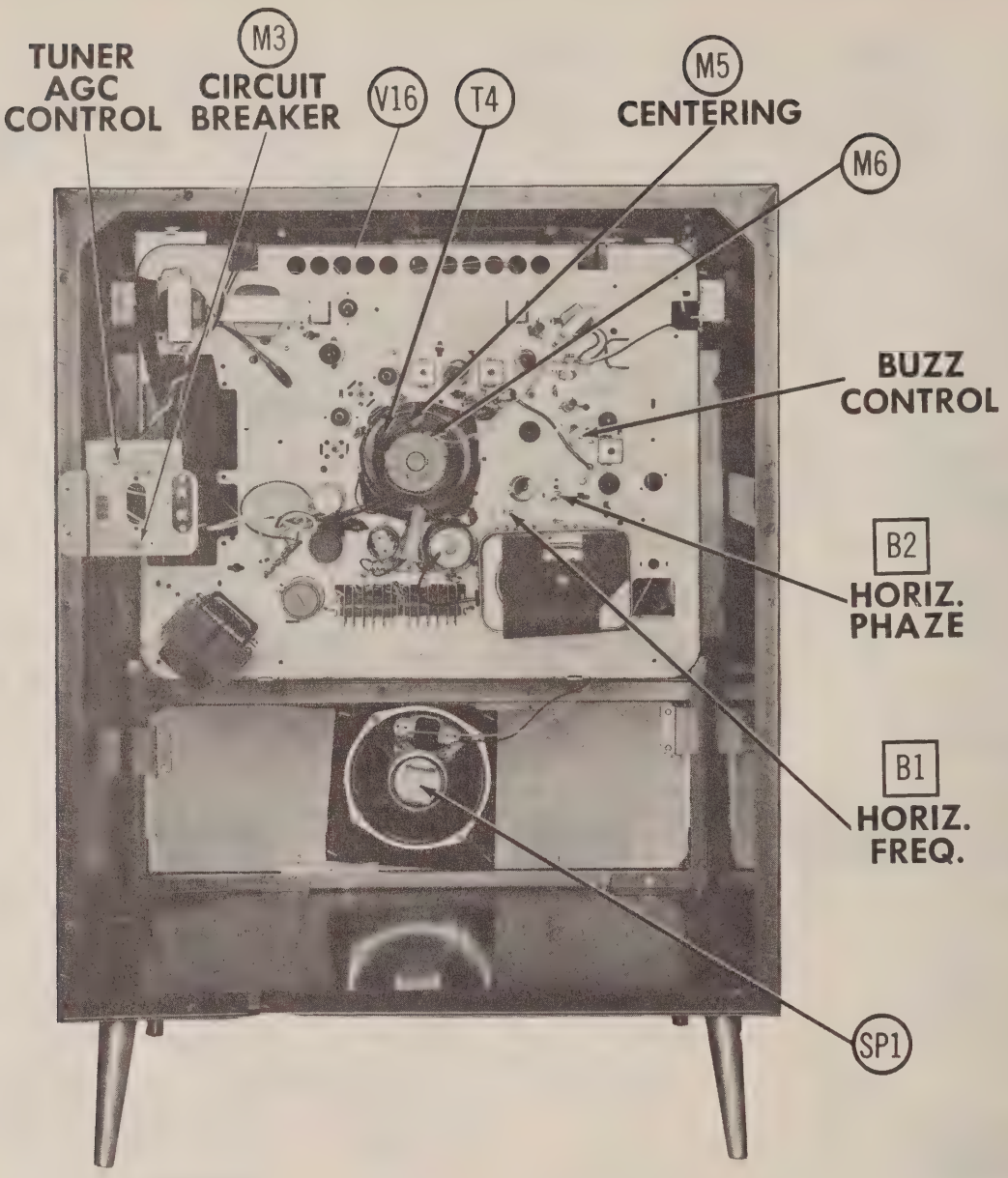
* Alternate Part No. D-211-26141.



RF TUNER TOP VIEW



TUNER & CONTROL ASSEMBLY



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn set on and tune in a TV station, preferably a test pattern.

① Set the horizontal hold control to its mid-range position.

② Connect a short clip lead across horizontal stabilizer coil (L19).

③ Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

④ Remove short from L19.

⑤ Connect the vertical amplifier of an oscilloscope thru a low capacitor probe to junction of L18, L19, R79 and C79. Low side to chassis. Adjust the horizontal phase slug (B2) until waveform similar to Fig. 3 if obtained. While making this adjustment keep the picture in sync with the horizontal hold control and if necessary B1.

⑥ Remove scope from junction of L18, L19, R79 and C79.

⑦ Turn the horizontal hold control fully clockwise, then fully counter clockwise. The picture should fall out of sync at both extreme ends of the horizontal hold control with equal number of sloping diagonal bars at both ends. If necessary, repeat steps 1 thru 6 .

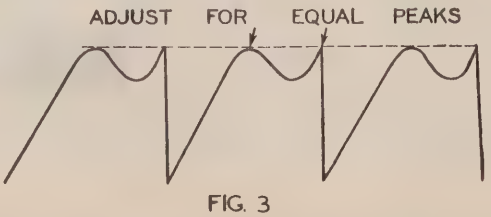
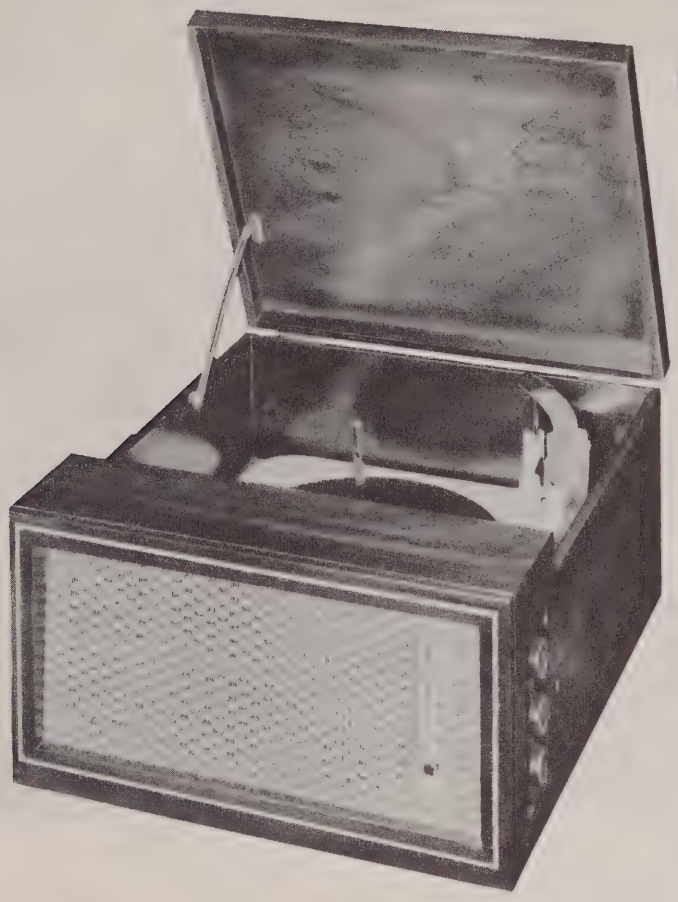


FIG. 3

DENVER, COLORADO



ROLAND
MODEL 5X6U

ROLAND
MODEL 5X6U

TRADE NAME	Roland Model 5X6U
MANUFACTURER	Roland Radio Corp., 12-30 Anderson Ave., Mt. Vernon, N. Y.
TYPE SET	AC Operated AM Superheterodyne Receiver with 3 Speed Automatic Record Changer
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AT6 Det. -AVC-AF Amp., 50C5 Output, 35W4 Rectifier

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING .22 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"

FOR SERVICE INFORMATION ON RECORD CHANGER-SEE SIMILAR V-M MODEL 954B-PHOTOFACT SET #302-FOLDER #12

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PARTS LIST AND DESCRIPTIONS

ROLAND
Model 5X6U

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det. -AVC-AF Amp.	12AT6	
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	ROLAND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150		PRS150V80-40	BBRT84215	TCT3117	TDLT-7	T-055	TVA-3455
B	80	150		20					
C	20	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	ROLAND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.05	200		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C3	.05	200		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C4A	220									
B	5000									
C	5000		♦	♦ PA-113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2	
D	250									
E										
C5	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C6	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C7	.01	600		BPD-01	DD-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C8	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	

♦ Items C4A, C4B, C4C, C4D, C4E, R6A, R6B and R6C are combined in one unit. When replacing items separately, C4D and C4E should total 250MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	ROLAND PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	VC-42	AB-70	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A.
R2A	100KΩ	½	VC-102	AB-41	A47-100K-Z	Q13-128	U-39	Tone
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

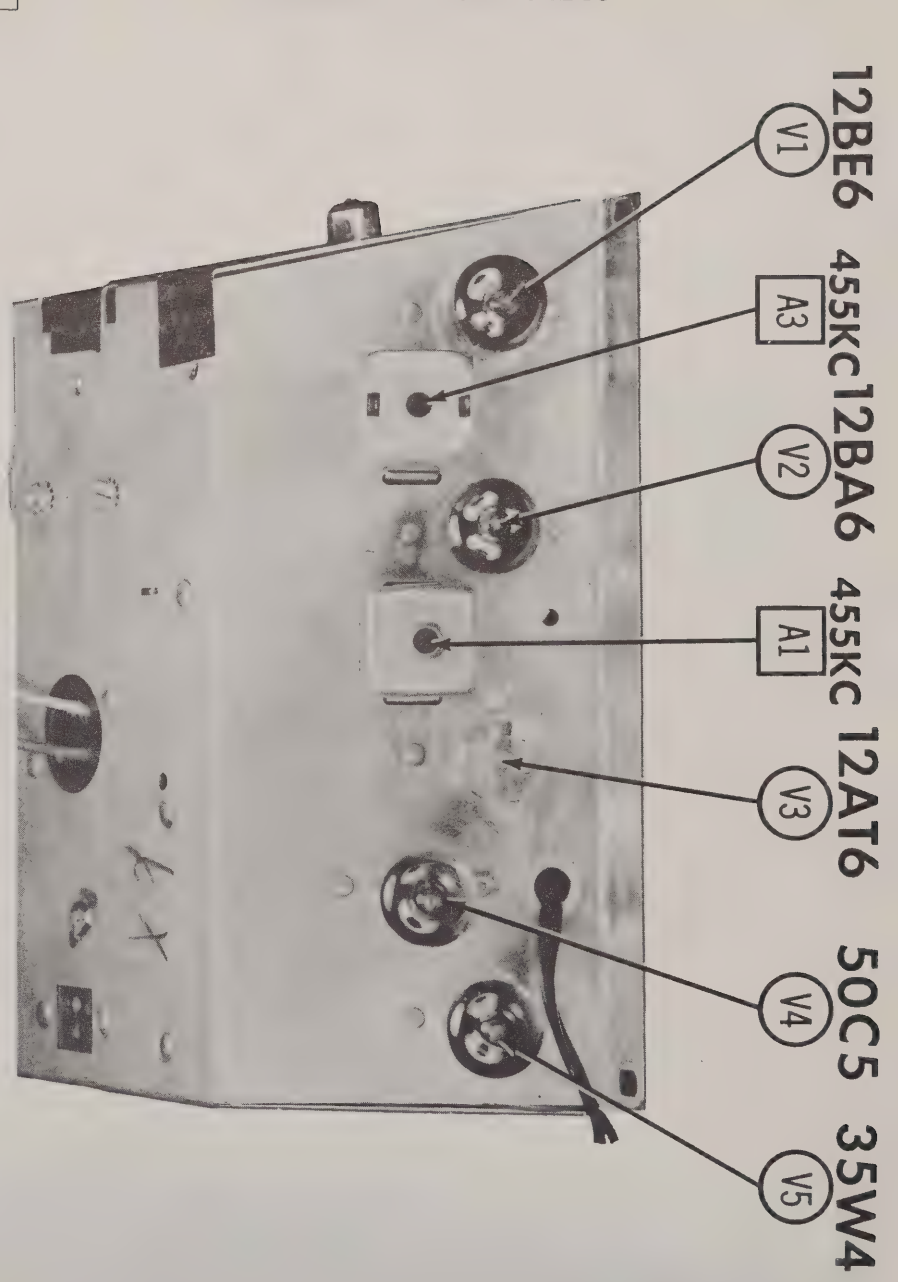
ITEM No.	RATING OHMS	RATING WATT	ROLAND PART No.	IRC PART No.	NOTES
R3	22KΩ			BTS-22K	
R4	150Ω			BTS-150	
R5	2.2Meg			BTS-2.2Meg	
R6A	6.8Meg			BTS-6.8Meg	
B	470KΩ		♦	BTS-470K	
C	470KΩ			BTS-470K	
R7	150Ω			BTS-150	
R8	330Ω	1		BTA-330	
R9	2200Ω	1		BTA-2200	
R10	22Ω	1		BTA-22	

♦ Items R6A, R6B, R6C, C4A, C4B, C4C, C4D, C4E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	ROLAND PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.6KΩ	3-4Ω	TR-120	Z1101	A-3025	A-3332	22S45 ①	S-12X	① Drill one new mtg. hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ROLAND PART No.	QUAM PART No.	RCA TYPE No.	
SP1	8"	PM	3-4Ω	SP-103-2	8A21	234S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ROLAND PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.4Ω						
L2	Osc. Coil	.4Ω	5.3Ω				69-Osc. *	
L3	Input IF	23Ω	23Ω	LF-50	16-6758	BC-352	12-C1	
L4	Output IF	27Ω	27Ω	LF-50	16-6758	BC-353	12-C2	

* Drill new mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	ROLAND PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1				46	0-1 or S-1 and 0-3	

ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

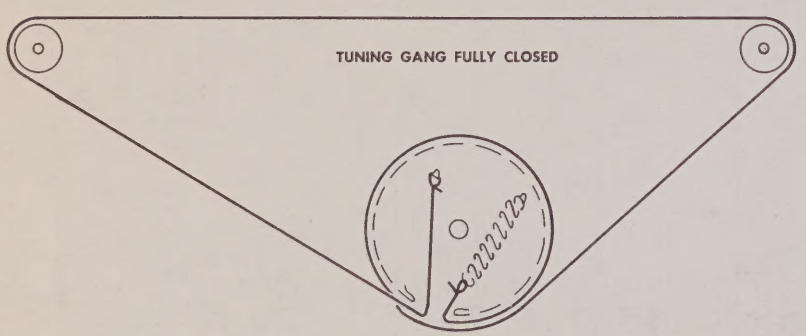
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	ROLAND PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		† CR-55 or ♦ CR-55D and † CR-55LP or ♦ CR-55LPD	† C-449 or ♦ C-449D and † A-448 or ♦ A-448D	† W-64S or ♦ W-64D and † W-64MGS or ♦ W-64MGD	† Jewel ♦ Diamond

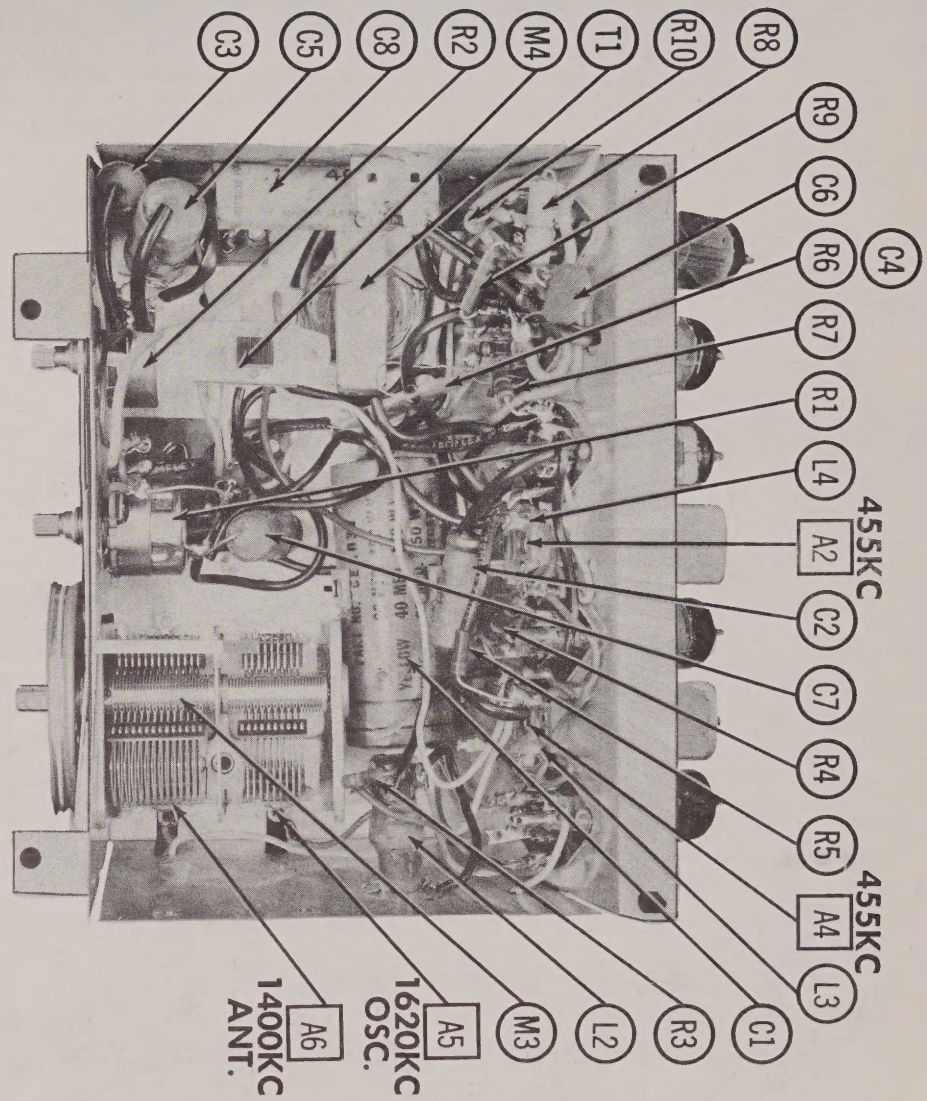
MISCELLANEOUS

ITEM No.	PART NAME	ROLAND PART No.	NOTES
M3	Tuning Cap.	CV72	2 Gang (34-475MMF, 28-195MMF)
M4	Switch		Radio-Phono (DPDT-Slide Type)

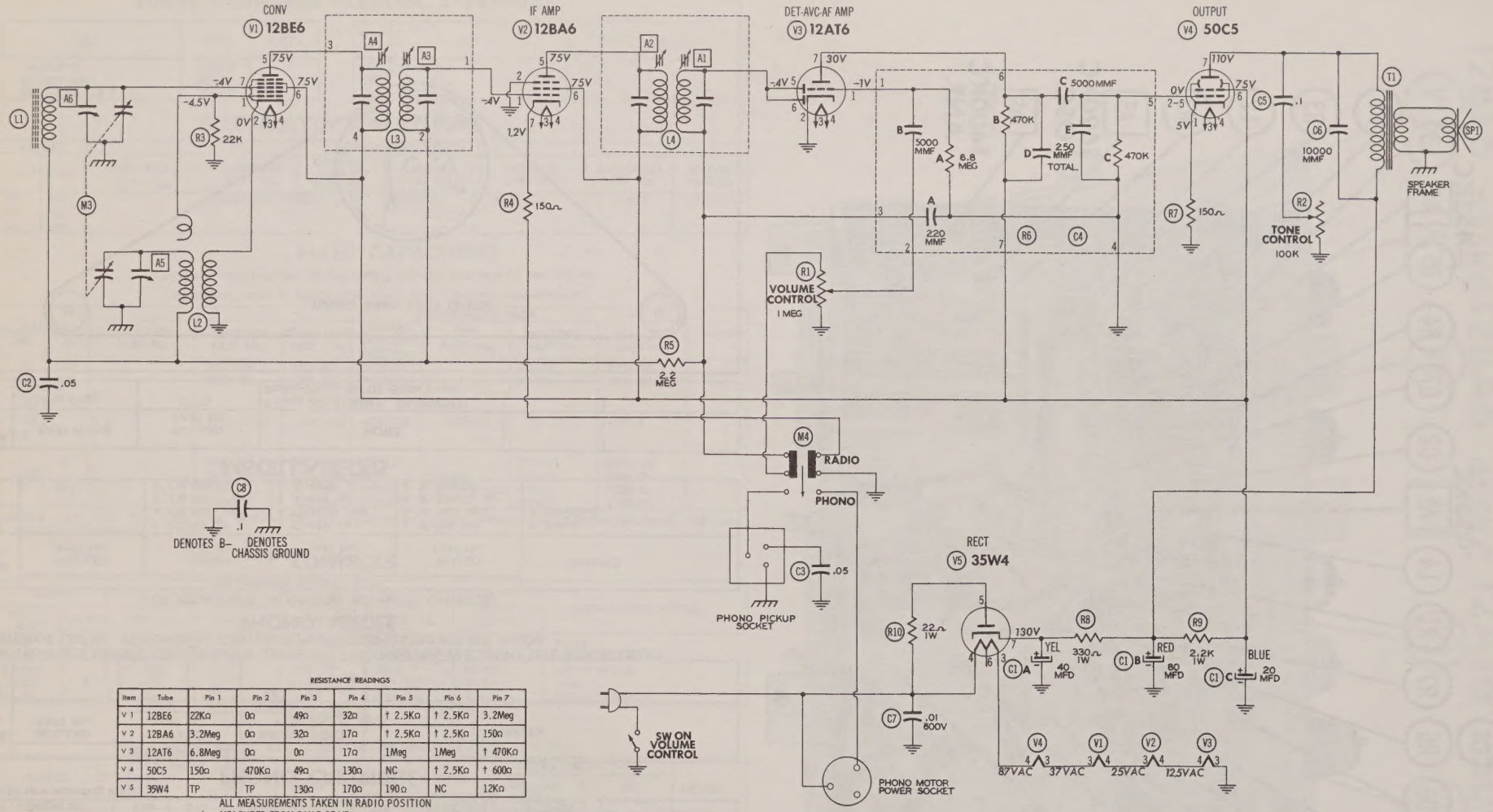


DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



ROLAND
Model 5X6U



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	0Ω	49Ω	32Ω	† 2.5KΩ	† 2.5KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	32Ω	17Ω	† 2.5KΩ	† 2.5KΩ	150Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	17Ω	1Meg	1Meg	† 470KΩ
V 4	50C5	150Ω	470KΩ	49Ω	130Ω	NC	† 2.5KΩ	† 600Ω
V 5	35W4	TP	TP	130Ω	170Ω	190Ω	NC	12KΩ

ALL MEASUREMENTS TAKEN IN RADIO POSITION
† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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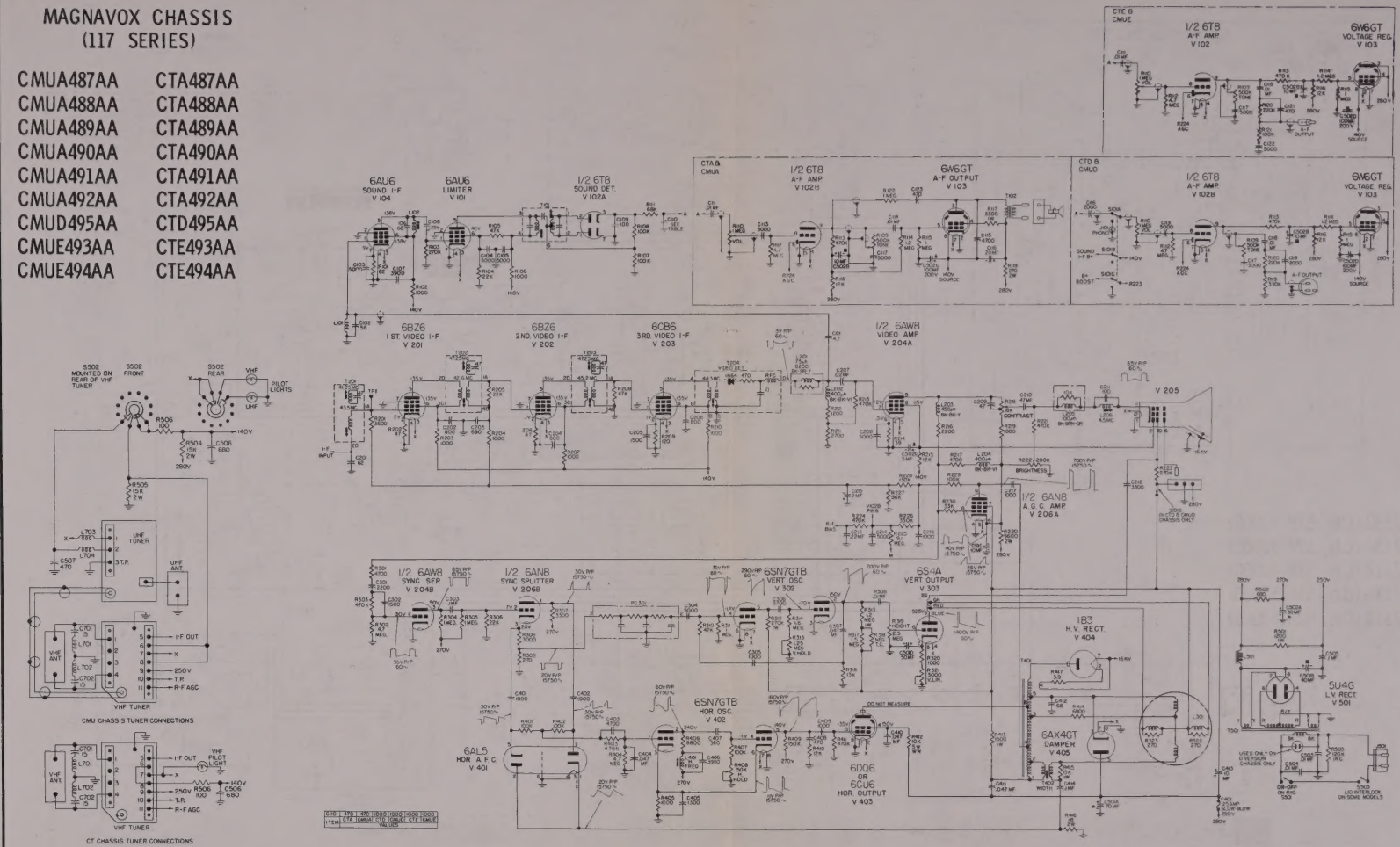
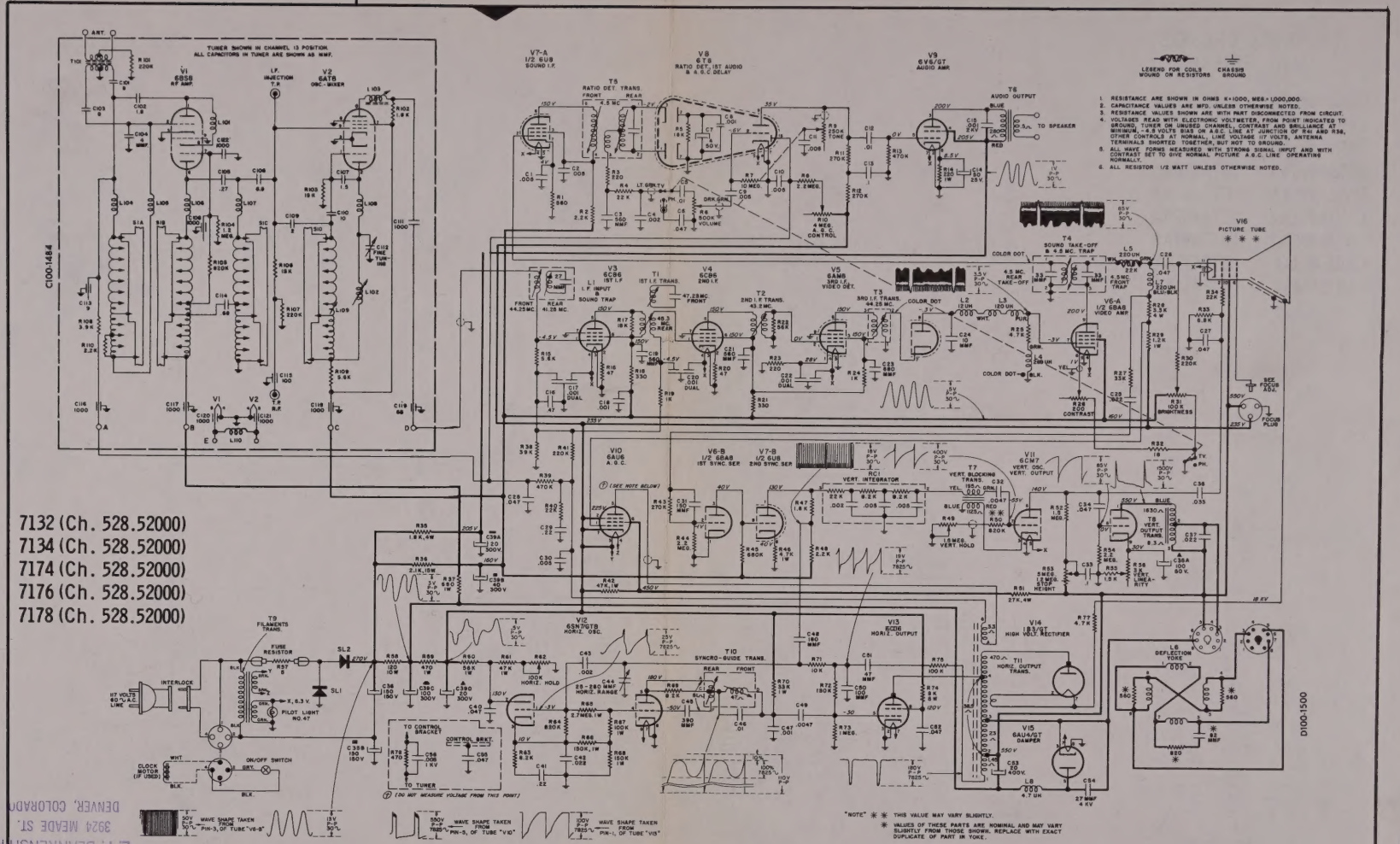
MAGNAVOX CHASSIS (117 SERIES)

CMUA487AA	CTA487AA
CMUA488AA	CTA488AA
CMUA489AA	CTA489AA
CMUA490AA	CTA490AA
CMUA491AA	CTA491AA
CMUA492AA	CTA492AA
CMUD495AA	CTD495AA
CMUE493AA	CTE493AA
CMUE494AA	CTE494AA


CTE & CMUE
1/2 6T8 A-F AMP V 102
6W6GT VOLTAGE REG. V 103
6AU6 SOUND I-F V 104
6AL6 LIMITER V 101
1/2 6T8 SOUND DET. V 102A
CTA & CMUA
1/2 6T8 A-F AMP V 102B
6W6GT A-F OUTPUT V 103
CTD & CMUD
6BZ6 1ST VIDEO I-F V 201
6BZ6 2ND VIDEO I-F V 202
6CB6 3RD VIDEO I-F V 203
1/2 6AW8 VIDEO AMP V 204A
V 205
1/2 6AN8 A.G.C. AMP V 206A
1/2 6AW8 SYNC SEP V 204B
1/2 6AN8 SYNC SPLITTER V 206B
6SN7GTB VERT OSC V 302
6S4A VERT OUTPUT V 303
1B3 H.V. RECT. V 404
6SN7GTB HOR OSC V 402
6AL5 HOR A.F.C. V 401
6D06 OR 6CU6 HOR. OUTPUT V 403
6AX4GT DAMPER V 405
5U4G L.V. RECT. V 501
S502 FRONT
S502 REAR
S505 MOUNTED ON REAR OF VHF TUNER
VHF
UHF
PILOT LIGHTS
UHF TUNER
VHF TUNER
I-F OUT
250V
T.P.
R-F AGC
CMU CHASSIS TUNER CONNECTIONS
CT CHASSIS TUNER CONNECTIONS
SCHEMATIC COURTESY OF THE MAGNAVOX CO.


7132 (Ch. 528.52000)
7134 (Ch. 528.52000)
7174 (Ch. 528.52000)
7176 (Ch. 528.52000)
7178 (Ch. 528.52000)
C100-1484
D100-1500
TUNER SHOWN IN CHANNEL 13 POSITION. ALL CAPACITORS IN TUNER ARE SHOWN AS MMF.
LEGEND FOR COILS WOUND ON RESISTORS
CHASSIS GROUND
1. RESISTANCE ARE SHOWN IN OHMS K=1000, MEG=1,000,000.
2. CAPACITANCE VALUES ARE MFD. UNLESS OTHERWISE NOTED.
3. RESISTANCE VALUES SHOWN ARE WITH PART DISCONNECTED FROM CIRCUIT.
4. VOLTAGES READ WITH ELECTRONIC VOLTMETER, FROM POINT INDICATED TO GROUND, TUNER ON UNUSED CHANNEL, CONTRAST AND BRILLIANCE AT MINIMUM, +4.5 VOLTS BIAS ON A.G.C. LINE AT JUNCTION OF R41 AND R38, OTHER CONTROLS AT NORMAL, LINE VOLTAGE 117 VOLTS, ANTENNA TERMINALS SHORTED TOGETHER, BUT NOT TO GROUND.
5. ALL WAVE FORMS MEASURED WITH STRONG SIGNAL INPUT AND WITH CONTRAST SET TO GIVE NORMAL PICTURE A.G.C. LINE OPERATING NORMALLY.
6. ALL RESISTOR 1/2 WATT UNLESS OTHERWISE NOTED.
"NOTE" * * THIS VALUE MAY VARY SLIGHTLY.
* VALUES OF THESE PARTS ARE NOMINAL AND MAY VARY SLIGHTLY FROM THOSE SHOWN. REPLACE WITH EXACT DUPLICATE OF PART IN YOKE.

SCHEMATIC COURTESY OF SEARS, ROEBUCK & CO.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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